

2500 HP Land Rig

LIST OF DEVICES
AND
TECHNICAL DESCRIPTION



TABLE OF CONTENTS

EQUIPMENT OF DRILLING RIG

| | | |
|---|---|----|
| A | DERRICK, SUBSTRUCTURE, DRAWWORKS AND HOISTING EQUIPMENT | 3 |
| B | ROTARY SYSTEM | 6 |
| C | MUD PUMPS AND STAND PIPE SYSTEM..... | 7 |
| D | MUD SYSTEM..... | 8 |
| E | ENERGY SUPPLY..... | 11 |
| F | WELL CONTROLL EQUIPMENT..... | 13 |
| G | DRILL STRING | 16 |
| H | PIPE HANDLING SYSTEM..... | 18 |
| I | MAKE-UP AND BRAKE-OUT EQUIPMENT | 20 |
| J | FISHING TOOLS | 20 |
| K | INSTRUMENTATION | 21 |
| L | SAFETY EQUIPMENT | 22 |
| M | CONTAINER..... | 22 |
| N | MISCELLANEOUS | 23 |
| O | ADDITIONAL EQUIPMENT | 24 |

A DERRICK, SUBSTRUCTURE, DRAWWORKS / HOISTING EQPT.

A 1 Mast

| | |
|----------------------|--|
| Manufacturer | M.I.L. (Morinoak International Limited) |
| Type | 157' x 35' Universal Cantilever Swing Lift |
| Year of construction | 1997 |
| Clear height | (m) 47.85 |

| | |
|---|------------|
| Hook load (max.) for wire quality EIPS 1 ½" | |
| with 14 lines | (kN) 5,900 |
| with 12 lines | (kN) 5,330 |
| with 10 lines | (kN) 4,530 |

| | |
|--|------------|
| Hook load (rated) for wire quality EIPS 1 ½" | |
| with 14 lines | (kN) 4,070 |
| with 12 lines | (kN) 3,550 |
| with 10 lines | (kN) 3,020 |

| | |
|-------------|------------|
| Crown Block | |
| Rated load | (kN) 5,780 |

| | |
|--------------------------|------------|
| Racking capacity | |
| 5" DP incl. 400m DC | (m) 10,100 |
| 5 ½" DP incl. 400 m DC | (m) 9,100 |
| 6 5/8" DP incl. 400 m DC | (m) 7,600 |

| | |
|----------------------|------------------|
| Stabbing Board | |
| Adjustable (from/to) | (m) 5.86 – 20.85 |
| Payload | (kN) 1.4 |

| | |
|---------------|-------|
| Escape System | |
| Manufacturer | Honor |
| Type | PED-6 |

A 2 Substructure

| | |
|--|---|
| Manufacturer | M.I.L. (Morinoak International Limited) |
| Type | 35' Swing Lift Self Elevating Sub-Structure |
| Year of construction | 1997 |
| Clear width | (m) 7.55 |
| Height Lower Edge Rotary Table | (m) 9.00 |
| Height Upper Edge Rotary Table | (m) 10.70 |
| DP Offload | (kN) 3,630 |
| Rotary Table load (max.) | (kN) 5,900 |
| Rotary Table load simultaneously with rotary | (kN) 3,630 |

| | |
|---|----------|
| BOP hoisting incl. radio remote control | |
| Load capacity | (kN) 396 |

A 3 Drawworks

| | | |
|--|-------|---|
| Manufacturer | | WIRTH |
| Type | | GH 2500 EG |
| Year of construction | | 1997 |
| Drive | | 2 DC motors GENERAL ELECTRIC GE-752 High Torque |
| Input power | (kW) | 1,840 |
| Line pull , 2 nd layer | (kN) | 532.3 |
| Auxiliary Brake | | Eddy current brake |
| Manufacturer | | BAYLOR |
| Type | | ELMAGCO 7838 |
| Anti-collision system (Automated Drawworks Control System) | | |
| Manufacturer | | BENTEC |
| Type | | ACS M-III |
| Feed Off System | | |
| Manufacturer | | BENTEC |
| Workspace | (m/h) | 0.5 – 63 |
| | (kN) | 2,452 |

A 4 Drilling Line and Sand Line**A 4.1 Drilling Line**

| | | |
|-----------------------|----------|----------------------|
| Diameter | (inches) | 1 ½ |
| Quality | | EIPS |
| Construction | | 8 x 19 Seals + 1 SES |
| Minimum breaking load | (kN) | 1,008 |

A 4.2 Sand Line

| | | |
|----------|----------|---|
| Diameter | (inches) | - |
| Length | (m) | - |

A 5 Dead Line Anchor

| | | |
|--------------|------|---------------|
| Manufacturer | | MARTIN-DECKER |
| Type | | EB |
| Capacity | (kN) | 444.8 |

A 6 TRAVELLING BLOCK AND HOOK

A 6.1 Travelling Block

| | | |
|----------------------|------|------------------|
| Manufacturer | | NATIONAL-OILWELL |
| Type | | 760-H-650 |
| Year of construction | | 1997 |
| Capacity | (kN) | 6,500 |

A 6.2 Hook

| | | |
|----------------------|------|-------|
| Manufacturer | | |
| Type | | |
| Year of construction | | |
| Capacity | (kN) | 5,780 |

A 7 SWIVEL

| | | |
|----------------------|-------|--------------|
| Manufacturer | | WIRTH |
| Type | | DDM 650-7500 |
| Year of construction | | 1997 |
| Stat. Capacity | (kN) | 5,800 |
| Nominal pressure | (bar) | 525 |

A 8 RIG WINCHES

| | | | |
|-----------------------|---------|-------------------|----------------|
| Number | (units) | 1 | 1 |
| Manufacturer | | Columbus McKinnon | INGERSOLL RAND |
| Type (pneum.) | | ESW Beta | LS1000R-E |
| Max. Cable 1st layer | (kN) | | 29.4 |
| Installation location | | Catwalk | Monkey Board |

A 9 HYDRAULIC WINCHES

| | | |
|-------------------------|---------|----------------|
| Number | (units) | 2 |
| Manufacturer | | NCS Hydraulics |
| Type | | TME-2/3 |
| Max. Cable 1st Location | (kN) | 47 |
| Cable length | (m) | 120 |
| Cable diameter | (mm) | 16 |
| Site | | Rig Floor |

B ROTARY SYSTEM

B 1 Rotary Table

| | | |
|----------------|----------------------|-------------------------|
| Manufacturer | | NATIONAL OILWELL |
| Type | | B – 37 ½" IRD |
| Drive | | hydraulic |
| Diameter | (inches) | 37 ½ |
| Stat. Capacity | (kN) | 5,900 |
| Max. Torque | (kNm) | 25 |
| Max. RPM | (min ⁻¹) | 14 |
| Inserts | | as per drilling program |

B 2 Top Drive

| | | | |
|----------------------|----------------------|---------------------|----------|
| Manufacturer | | MARITIME HYDRAULICS | |
| Model | | DDM 650L-DC 2speed | |
| Drive | | electric | |
| Output | (kW) | 735 | |
| Capacity | (kN) | 5,800 | |
| | | 1st Gear | 2nd Gear |
| Max. Torque | (daNm) | 7,570 | 4,930 |
| Continuous torque | (daNm) | 6,835 | 4,440 |
| Max. rev count | (min ⁻¹) | 154 | 237 |
| Continuous rev count | (min ⁻¹) | 104 | 161 |

B 2.1 Soft Torque System

| | |
|--------------|---------------|
| Manufacturer | Bentec |
| Type | STRS Mark III |

C MUD PUMPS AND STAND PIPE SYSTEM

C 1 Mud Pumps

| | |
|--------------|------------------|
| Count | 3 |
| Manufacturer | Wirth |
| Type | TPK 2200 |
| Drive | 2 DC motors each |

| | | |
|------------------------------------|------|------|
| Available input power each pump | (kW) | 1640 |
|------------------------------------|------|------|

| | | |
|---------------------------|---------|------|
| at piston/liner diameter: | (inch) | 5 |
| max. pressure: | (bar) | 517 |
| max. flow rate: | (l/min) | 1500 |

| | | |
|---------------------------|---------|------|
| at piston/liner diameter: | (inch) | 7 ½ |
| max. pressure: | (bar) | 265 |
| max. flow rate: | (l/min) | 3348 |

Other liner dimensions are not maintained

C 2 Stand Pipe

| | |
|-----------------|-------------|
| Number | 1 |
| Inside diameter | (inch) 5 |
| Rated pressure | (psi) 7,500 |

C 3 Rotary Hose

| | |
|-----------------|-------------|
| Number | 1 |
| Inside diameter | (Zoll) 3 ½ |
| Rated pressure | (psi) 7,500 |

C 4 Circulation Heads

| | | |
|---------------------------|---------|---|
| for connectors 6 5/8" FH: | (units) | 1 |
| for connectors NC50: | (units) | 1 |
| for connectors NC38: | (units) | 1 |

D MUD SYSTEM

D 1 Active System

| | | |
|--------------|------|---------------------------|
| Total volume | (m3) | 260 (not incl. mud silos) |
|--------------|------|---------------------------|

D 1.1 Shale Shaker Tank

| | | |
|---------------------------------------|---------|-----|
| Volume | (m3) | 30 |
| Number of compartments | (units) | 2 |
| Number of Agitators | (units) | 2 |
| Power | (kW) | 7.5 |
| Sand Trap | (m3) | 10 |
| Level monitoring with 3 radar sensors | | |

D 1.2 Suction tank

| | | |
|---------------------------------------|---------|-----|
| Number | (units) | 1 |
| Volume | (m3) | 60 |
| Number of compartments | (units) | 2 |
| Number of Agitators | (units) | 4 |
| Power | (kW) | 7.5 |
| Level monitoring with 2 radar sensors | | |

D 1.3 Reserve tank

| | | |
|---------------------------------------|---------|-----|
| Number | (units) | 1 |
| Volume | (m3) | 60 |
| Number of compartments | (units) | 3 |
| Number of Agitators | (units) | 4 |
| Power | (kW) | 7.5 |
| Level monitoring with 3 radar sensors | | |

D 1.4

Mud Silo

| | | |
|---------------------------------------|-----------------------|-----------|
| Number | | 4 |
| Mud weight | (kg/dm ³) | 2.5 |
| Volume | (m ³) | each 37.5 |
| Level monitoring with 4 radar sensors | | |

D 1.5

Trip Tank

| | | |
|---------------------------------------|-------------------|-----------------------|
| Number | (units) | 1 |
| Chamber volume | (m ³) | 2 x 3.5m ³ |
| Remote control | | Remote I/O with |
| | Profibus | |
| Number of centrifugal pumps | (units) | 2 |
| Type | | 4" x 3" x 13" |
| Power | (kW) | 15 |
| Level monitoring with 2 radar sensors | | |

D 2 Mixing System

D 2.1 Mixing Tank 1

| | | |
|---------------------------------------|---------|--|
| Volume | (m3) | 50 |
| Number of compartments | (units) | 3 (2 x 10m ³ , 1 x 30m ³) |
| Number of | | |
| Agitators | (units) | 4 |
| Power | (kW) | 7.5 |
| Level monitoring with 3 radar sensors | | |

D 2.2 Mixing Tank 2

| | | |
|---------------------------------------|---------|----------------------------|
| Content | (m3) | 50 |
| Number of compartments | (units) | 2 (25 m ³ each) |
| Number of | | |
| Agitators | (units) | 4 |
| Power | (kW) | 7.5 |
| Level monitoring with 2 radar sensors | | |

| | | | |
|-------|-------------------------------------|---------|-------------------------|
| D 2.3 | Pill Tank | | |
| | Number | (units) | 1 with 15m ³ |
| | (a compartment of the Reserve Tank) | | |

D 2.4 Mixing Hopper

| | | |
|--------|---------|---|
| Number | (units) | 3 |
|--------|---------|---|

D 2.5 Mixing Pumps

| | | |
|--------------|---------|----------------------|
| Number | (units) | 3 |
| Manufacturer | | Amteq/Mission Magnum |
| Type | | 6" x 8" x 14" |
| Drive | | electric |
| Power | (kW) | 90 |

D 2.6 Transfer Pumps

| | | |
|---|---------|----------------------|
| Number | (units) | 2 |
| Manufacturer | | Amteq/Mission Magnum |
| Type | | 6" x 8" x 14" |
| Drive | | electric |
| Power | (kW) | 75 |
| One pump via VFD to supply the Desilter | | |

D 3 Chemicals Conditioning Tank

| | | |
|----------|------|-----|
| Content | (m3) | 1.5 |
| Agitator | | yes |

D 4.1 Shale Shaker

D 4.2 Desander 1 Mud Cleaner in 23" – Drill section

D 4.4 Vacuum Degasser

D 4.5 Dry Material Silo

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E ENERGY SUPPLY

| | | | |
|------------|--|----------------------|--|
| E 1 | Power unit | | Electric |
| | Normal operation | | over 20 kV grid feed |
| | in the event of a power failure | | diesel-electric |
| | Mains parallel operation | | Mains supply with simultaneous generator operation |
| | Monitoring | | Fully automatic operation, circuits and load specifications are monitored by a load management system |
| E 2 | Energy requirement | | |
| | Network connection | (kVA) | max. 4,500 |
| E 3 | Diesel Motors | | |
| | Number | (units) | 2(Additionally 2 back up motors) |
| | Manufacturer | | CATERPILLAR |
| | Type | | 3512-B |
| | Power | (kW) | each 1,195 |
| | at | (min ⁻¹) | 1,500 |
| E 4 | Generators | | |
| | Number | (units) | 2(Additionally 2 back up generators) |
| | Manufacturer | | LEROY SOMER |
| | Type | | LS 51 |
| | Power | (kVA) | each 2,000 |
| E 5 | Energy Distribution (SCR / MCC) | | |
| | SCR Unit Manufacturer | | BENTEC |
| | | (units) | 2 SCR for Drawworks |
| | | (units) | 3 SCR for Mud Pumps |
| | | (units) | 1 SCR for Top Drive |
| | Other systems/controls: | | Drawworks Control MH Wirth Top Drive Control MH Wirth Bentec: Soft Pump/ACS/Soft Torque MCC 690 V |
| | Add. MCC Container Manufacturer | | Fest AG MCC 690V / MCC 400V |
| E 6 | Fuel tanks | | |
| | Number | (units) | 1 |
| | Content | (m ³) | 40 |

E 7 Compressor

| | | |
|---------------------------------------|---------|-------------|
| Number | (units) | 2 |
| Manufacturer | | Atlas Copco |
| Type | | GA18 VSP+P |
| Power (max.) | (kW) | each 18 |
| Working pressure (max.) | (bar) | 13 |
| Storage capacity | (l) | 1,500 |
| Air drying | | yes |
| Incl. Freeze protection and dew point | | |

F WELL CONTROL EQUIPMENT

F 1 Ring Preventer

| | | | |
|------------------------------|--------|--------|---------|
| Count | | 1 | 1 |
| Manufacturer | | HYDRIL | CAMERON |
| Type | | MSP | D |
| Size | (inch) | 21 ¼ | 13 5/8 |
| Pressure stage | (psi) | 2,000 | 10,000 |
| H ₂ S-suitability | | yes | yes |

F 2 Ram Preventer

| | | | |
|------------------------------|--------|-----------|-------------|
| Number and version | | 2 | 2 |
| Manufacturer | | SHAFFER | CAMERON |
| Type | | LWS | U |
| Size | (inch) | 21 ¼ | 13 5/8 |
| | | easy/easy | easy/double |
| Pressure stage | (psi) | 2,000 | 10,000 |
| H ₂ S-suitability | | yes | yes |
| Lateral connections | | | |
| Kill line | (inch) | 3 1/16 | 2 x 2 1/16 |
| Choke line | (inch) | 3 1/16 | 2 x 4 1/16 |
| Pressure stage | (psi) | 10,000 | 10,000 |

F 3 Rams

| | | | |
|---------------|-------------------------|-------|---------|
| F 3.1 | Pipe/Casing Rams | 21 ¼" | 13 5/8" |
| Linkage block | | | |
| Number | (set) | 1 | 2 |
| Diameter | (inch) | 5 | 5 |
| Number | (set) | | 2 |
| Diameter | (inch) | | 3 1/2 |
| Number | (set) | | 1 |
| Diameter | (inch) | | 6 5/8 |

| | | | | |
|--------------|-------------------|-------|---|---|
| F 3.2 | Total Rams | (set) | 1 | - |
|--------------|-------------------|-------|---|---|

| | | | | |
|--------------|-------------------|-------|---|---|
| F 3.3 | Shear Rams | (set) | - | 1 |
|--------------|-------------------|-------|---|---|

F 3.4 Variable Rams

| | | | |
|----------------------|--------|---------|-----------|
| Number | (set) | 1 | 1 |
| Size range (from/to) | (inch) | 4 ½ - 7 | 2 7/8 – 5 |
| Number | (set) | | 3 |
| Size range (from/to) | (inch) | | 4 ½ - 7 |

F 3.5 Stripping Equipment

| | | | |
|----------------|--|-----|--|
| Stripping Tank | | yes | |
|----------------|--|-----|--|

| | | |
|------------|--|--|
| F 4 | Drilling Spools/Adapter Flanges | Suitable for the preventers 21 1/4" and 13 3/8" and for flanging with side outlets 2 1/16", 3 1/16", 4 1/16" |
| F 5 | BOP Unit | |
| | Manufacturer | NCS |
| | Type | BOP HPU-2X200-210-2000-400/50 |
| | Series nr. | NCS-2012-10-03-004 |
| | Total storage capacity (l) | 30 x 50l = 1500 l |
| | Storage pressure (bar) | 210 |
| | Hydraulic pumps | |
| | Number | 2 x Axial piston pump |
| | Type | V30D-140 RKN-1-1-04/LN-2/221450 |
| | Flow (l/min) | 203 |
| | 2. Independent supply of the locking system through: | |
| | Emergency generator | Perkins |
| | Type | GEP 65 - 2 |
| | Performance data | 60 kVA with cos phi 0.8/400V/50Hz |
| | Ring preventer pressure control valve | yes |
| | Distributor pressure control valve | yes |
| | Main control | |
| | Number of stations | 7 |
| | Remote controls | |
| | Number | 2 |
| | Location | Drillers Cabin as well as BOP control room |
| | Number of stations | 7 |
| | Remote control for mud pumps | yes |
| | Displays | Pump strokes, DP pressure, Annular pressure, Autom. Choke incl. threshold settings |

F 6 Discharge Line

| | |
|------------------------------|-----|
| H ₂ S-suitability | yes |
|------------------------------|-----|

F 6.1 Choke Manifold

| | | |
|------------------------------------|--------|--------|
| Inner diameter of straight By-pass | (inch) | 3 1/16 |
| Rated pressure input | (psi) | 10,000 |
| Rated pressure output | (psi) | 5.000 |
| Manual nozzle(s) | | |
| Number | | 1 |
| Rated diameter | (inch) | 3 |
| Remote controlled nozzle(s) | | |
| Number | | 1 |
| Rated diameter | (inch) | 2 |
| Automatic control | | yes |

F 6.2 Choke Line

| | | |
|-----------------|--------|--------|
| Number | | 2 |
| Inner diameter | (inch) | 4 1/16 |
| Length | (m) | 6.3 |
| Rated pressure | (psi) | 10,000 |
| Manual slide | | |
| Number | | 3 |
| Rated pressure | (psi) | 10,000 |
| Hydraulic slide | | |
| Number | | 2 |
| Rated pressure | (psi) | 10,000 |

F 6.3 Kill Line

| | | |
|-----------------|--------|--------|
| Number | | 2 |
| Inner diameter | (inch) | 2 |
| Length | (m) | 6 |
| Rated pressure | (psi) | 10,000 |
| Manual slide | | |
| Number | | 4 |
| Rated pressure | (psi) | 10,000 |
| Hydraulic slide | | |
| Number | | - |
| Rated pressure | (psi) | - |
| Check valves | | yes |
| Number | | 2 |

F 6.4 Mud Gas Separator with Flare

| | | |
|-------------------------|--------|--------------------------------|
| Separator | | yes |
| Flare height | (m) | 15 |
| Outer diameter | (inch) | 12 |
| Igniting device | | electrically with pilot burner |
| Length of inlet | (m) | 30 |
| Rated pressure of inlet | (bar) | 15 |

F 7 Preventer Test Equipment**F 7.1 Test Unit**

| | | |
|-------------------|-------|--------|
| Rated pressure | (psi) | 10,000 |
| Pressure recorder | | yes |

F 7.2 Cup Type Tester

piping program

as per standard

F 7.3 Plug Type Testeras per flanging (for
Permian standard)**F 8 Inner Preventer**

| | | | |
|---------------------|--------|--------|--------|
| Number | | 1 | 1 |
| Threaded connection | (inch) | 4 ½ IF | 3 ½ IF |
| Rated pressure | (psi) | 10,000 | 10,000 |
| H2S suitability | | yes | yes |

| | | |
|---------------------|--------|----------|
| Number | | 1 |
| Threaded connection | (inch) | 6 5/8 FH |
| Rated pressure | (psi) | 10,000 |
| H2S suitability | | yes |

F 9 Ball Check Valve

| | | |
|-------------------|--------|---|
| Number | | - |
| Outer diameter | (inch) | - |
| Inner diameter | (inch) | - |
| Landing nipple | | - |
| Outer diameter | (inch) | - |
| Inner diameter | (inch) | - |
| Thread connection | (inch) | - |

F 10 Drill String Check Valve incl. Valve Body

| | | |
|-------------------|--------|---|
| Number | | - |
| Thread connection | (inch) | - |

F 11 B.O.P. Hoisting

| | | |
|----------------------|--|-------------------------|
| | | yes |
| Drive | | pneumatic (see also A2) |
| Radio remote control | | yes |

G DRILL STRING**G 1 Kelly(s)**

| | | |
|--------------------------------------|--------|-----------------|
| Number | | n/a (Top Drive) |
| Outer diameter | (inch) | - |
| Length | (m) | - |
| Kelly "already piece" with protector | | no |

G 2 Kelly Cocks**G 2.1 Upper Kelly Cocks**

| | | |
|------------------|-------|-----------------------------|
| Number | | 2 |
| Manufacturer | | MARITIME HYDRAULICS |
| Nominal pressure | (psi) | 10,000 |
| Operation | | 1 x hydraulic 1 x manual |

G 3 Drill Pipe

| | | | |
|--------------------------|----------|---------------|----------|
| Outer diameter | (inch) | 6 5/8 | 5 |
| Total length | (m) | 4950 | 2850 |
| Nominal weight | (lbs/ft) | 27.7 | 25.6 |
| Grade/quality class | | G-105 | C-120 |
| Class | | Premium | Premium |
| Threaded connection | | 6 5/8 FH | NC 50 |
| Connector outer diameter | (inch) | 8 1/2 | 6 5/8 |
| Connector inner diameter | (inch) | 4 1/4 | 3 1/4 |
| Connector quality grade | | API | API |
| Plating | | yes | Smooth X |
| Inner coating | | yes | yes |
| Outer diameter | (inch) | 5 | 5 |
| Total length | (m) | 5000 | 1000 |
| Nominal weight | (lbs/ft) | 19.5 | 19.5 |
| Grade/quality class | | S-135 | G-105 |
| Class | | Premium | Premium |
| Threaded connection | | NC 50 Vam Eis | NC 50 |
| Connector outer diameter | (inch) | 6 3/8 | 6 3/8 |
| Connector inner diameter | (inch) | 3 1/2 | 3 1/4 |
| Connector quality grade | | NS1 | API |
| Plating | | Arnco 300 XT | no |
| Inner coating | | TK 34 | yes |
| Outer diameter | (inch) | 3 1/2 | |
| Total length | (m) | 6850 | |
| Nominal weight | (lbs/ft) | 15.5 | |
| Grade/quality class | | S-135 | |
| Class | | Premium | |
| Threaded connection | | NC 38 Vam Eis | |
| Connector outer diameter | (inch) | 5 | |
| Connector inner diameter | (inch) | 2 3/8" | |
| Connector quality class | | API | |
| Plating | | no | |
| Inner coating | | no | |

G 4 Pipe Change

Suitable for 3.5" and 5" DP S-135

| | | |
|--------|---------|----------------|
| Number | (units) | 9 div. lengths |
|--------|---------|----------------|

G 5 Heavy Weight Drill Pipe (HWDP)

| | | | |
|--------------------------|----------|----------|----------|
| Number | (units) | 40 | 43 |
| Nominal diameter | (inch) | 5 | 3 1/2 |
| Nominal weight | (lbs/ft) | 50 | 26.2 |
| Threaded connection | | NC 50 | NC 38 |
| Connector outer diameter | (inch) | 6 1/2 | 4 3/4 |
| Connector inner diameter | (inch) | 3 1/16 | 2 9/16 |
| Plating | (type) | Smooth-X | Smooth-X |
| Model | | | spiral |

G 6 Drill Collars (DC)

| | | | |
|---------------------|--------|-----------|-----------|
| Number | | 22 | 22 |
| Outer diameter | (inch) | 9 1/2 | 8 1/4 |
| Inner diameter | (inch) | 3 | 2 13/16 |
| Nominal weight | (kg/m) | 326.1 | 239.3 |
| Threaded connection | (inch) | 7 5/8 Reg | 6 5/8 Reg |
| Spiral grooves | | yes | yes |
| Trepan for slip | | no | yes |

| | | | |
|----------------------|--------|---------|---------|
| Number | | 20 | 7 |
| Outer diameter | (inch) | 6 1/2" | 6 1/4" |
| Inner diameter | (inch) | 2 13/16 | 2 13/16 |
| Nominal weight | (kg/m) | 130 | 123 |
| Threaded connections | (inch) | NC 50 | NC 46 |
| Spiral grooves | | yes | yes |
| Trepan for slip | | yes | yes |

| | | | |
|---------------------|--------|--------|--------|
| Number | | 23 | 20 |
| Outer diameter | (inch) | 4 3/4" | 4 3/4" |
| Inner diameter | (inch) | 2 1/4" | 2 1/4" |
| Nominal weight | (kg/m) | 68 | 68 |
| Threaded connection | (inch) | NC 35 | NC 38 |
| Spiral grooves | | yes | yes |
| Trepan for slip | | yes | yes |

G 7 Crossover

At a sufficient amount for each bottom hole assembly to be installed by the DRILLING CONTRACTOR

H PIPE HANDLING SYSTEM

| | |
|--------------------|--|
| Elevator Links | 1 set 2 ¾" x132" 350 Ton |
| Elevators | 2 x 3 ½" hand elevator 250 to 1 x 5" hand elevator 350 to 1 x 5" hand elevator 200 to 1 x 6 5/8" hand elevator 350 to |
| Automatic Elevator | for 6 5/8", 5" and 3 1/2" DP 1 x air elevator 350 to 1 x air elevator 250 to |
| Rig Tong | 2 x BV 100 4"-17" 2 x BV 55 3 ½" x 13 3/8" 2 x F 2 3/8" x 10 ¾" |
| Automatic Slips | 2 x Blohm & Voss PSA – 150 pneumatic 2 x 3 ½" air slips 1 x 5" air slips 1 x 6 5/8" air slips |
| Slips | 1 x 3 ½" hand slips 1 x 4 ½" hand slips 2 x 5" hand slips 1 x 6 5/8" hand slips 5 x DC hand slips 4" - 4 7/8", 5 ½" - 7", 6 ¾" - 8 ¼", 8" - 9 ½", 8 ½" - 10" |
| Chain Tongs | 6 x chain tongs 2 7/8" - 3 3/8", 3 ¾" - 4 ¾" , 4 ½" - 5 5/8", 5 ½" - 7", 6 ¾" - 8 ¾", 8" - 9 ½" |
| Stabbing Guides | - |
| Bit Breaker | Standard roller cone bits as per drilling program |

I MAKE-UP / BREAK-OUT EQUIPMENT

I 1 Catheads

Number -

I 2 Ezy Torque

Manufacturer MARITIME HYDRAULICS
Type MH 1887

I 3 Spinning Wrench

Manufacturer MARITIME HYDRAULICS
High Torque yes
Long rollers for piecing HWDP yes
included in I 5

I 4 Torque Wrench

Manufacturer MARITIME HYDRAULICS
High Torque design yes
included in I 5

I 5 Iron Roughneck

Manufacturer MARITIME HYDRAULICS
Type MH 1898 (BC251)
Torque (kNm) 35/169

I 6 Kelly Spinner

n/a (Top Drive)

J FISHING TOOLS

Overshots incl. extension

incl. Accessories for the drill string
DRILLING CONTRACTOR, dimensions in
coordination with the drilling and piping
program; wear parts are hardened and
tempered.

K INSTRUMENTATION

K 1 Hook Load Indicator

MD/TOTCO
National Type EB

K 2 Indicators

| | | |
|--|-----------------------------|-------------------|
| Analogue | hook load | (tonnes) |
| | Weight on bit | (tonnes) |
| | Turntable speed | (U/min) |
| | Top Drive speed | (U/min) |
| | Drilling rate | (m/hour) |
| | Pump pressure | (bar) |
| | Iron Roughneck screw torque | (kNm) |
| | Torque Wrench screw torque | (kNm) |
| | Turntable torque | (kNm) |
| | Top Drive torque | (kNm) |
| 2 x PC monitors (incl. alarm- limit) | hook load | (tonnes) |
| | block position | (m) |
| | block speed | (m/sec) |
| | Drilling progress | (min/m + m/hr) |
| | Depth | (metres) |
| | Chisel time | (hours) |
| | Chisel load | (tonnes) |
| | Reeving | (wires) |
| | Tonnes kilometre | (tokm) |
| | Pump strokes I + II | (strokes/min) |
| | Pump stroke-counter I + II | (display strokes) |
| | Pump rate I + II | (l/min) |
| | Total pump strokes | (strokes/min) |
| | Total pump stroke counter | (display strokes) |
| | Top Drive torque | (kNm) |
| | Turntable torque | (kNm) |
| | Iron Roughneck screw torque | (kNm) |
| | Riser pressure | (bar) |
| | Choke Manifold pressure | (bar) |
| | Top Drive rev count | (U/min) |
| | Turntable rev count | (U/min) |

K 3 Tank Volume Indicator

For the following tanks:

Sandtrap
Shaker Tank 1
Shaker Tank 2
Suction Tank 1
Suction Tank 2
Mix Tank 1.1
Mix Tank 1.2
Mix Tank 2.1
Mix Tank 2.2
Pill Tank
Reserve Tank 1

Reserve Tank 2
Reserve Tank 3

Total volume display for active tanks

yes, via PC monitor drillers cabin/tank system

Fine display supply/losses

yes, via PC monitor drillers cabin/tank system

K 4 Trip Tank

Contents

(m³)

2 x 3.5

Circulation pump

yes, 2 x 15kW

Display incl. alarm threshold value

PC monitor drillers cabin

Linkage volume display

(m³)

PC monitor drillers cabin

Display of total linkage volume

PC monitor drillers cabin

Display of total volume of last trip

PC monitor drillers cabin

K 5 Annulus monitoring

Number of annulars

3

L SAFETY EQUIPMENT IN ACCORDANCE WITH MOUNTAIN REGULATIONS

Gas protection equipment at sour gas wells

External weathering in sour gas wells

First Aid equipment incl. defibrillator

Fire protection equipment

M OFFICE / ACCOMMODATION

Office building

Company Man sleeper

Toolpusher sleeper

2 x Washing and changing container

2 x Team container

(Smokers and non-smokers)

Gas protection container

Service container

Toilet and laundry container

Ladies washing and changing container

Mechanic workshop container

Store container

E-workshop incl. store

Pump store

| | | | |
|-------------|---|--------|--|
| N | MISCELLANEOUS | | |
| N 1 | Telephone for DRILLING CONTRACTOR | | Installation by DRILLING CONTRACTOR Dues incurred by DRILLING CONTRACTOR |
| N 2 | Pipe and Casing Rack | | capacity according to drilling programme |
| N 3 | Combustion and Welding Machine(s) | | Standard devices |
| N 4 | High Pressure Cleaner | | 1 ATH in container, fixed piping system with several taps |
| N 5 | Kelly and Mousehole | | |
| | Mousehole | (inch) | 13 3/8 |
| N 6 | Pipe Calibre | | one piece each for all casing sizes specified by the DRILLING OPERATOR as well as for the drill string |
| N 7 | Bit Gauge | | one piece each for all bit diameters specified by the DRILLING OPERATOR |
| N 8 | Cellar Pump | | |
| | Manufacturer | | DIA |
| | Type | | SHE 102 R |
| | Drive (electric) | (kW) | 3.6 |
| N 9 | Stripping plates for drill sting | | in sufficient quantity |
| N 10 | Forklift | | |
| | Manufacturer | | Linde |
| | Type | | H 60 D |
| | Capacity | (kN) | 60 |
| N 11 | Drip-Pan | | yes |
| N 13 | Cementing Line from ground level up to Rig Floor | | yes |
| | Rated pressure | (psi) | 10,000 |

N 14 Communication System

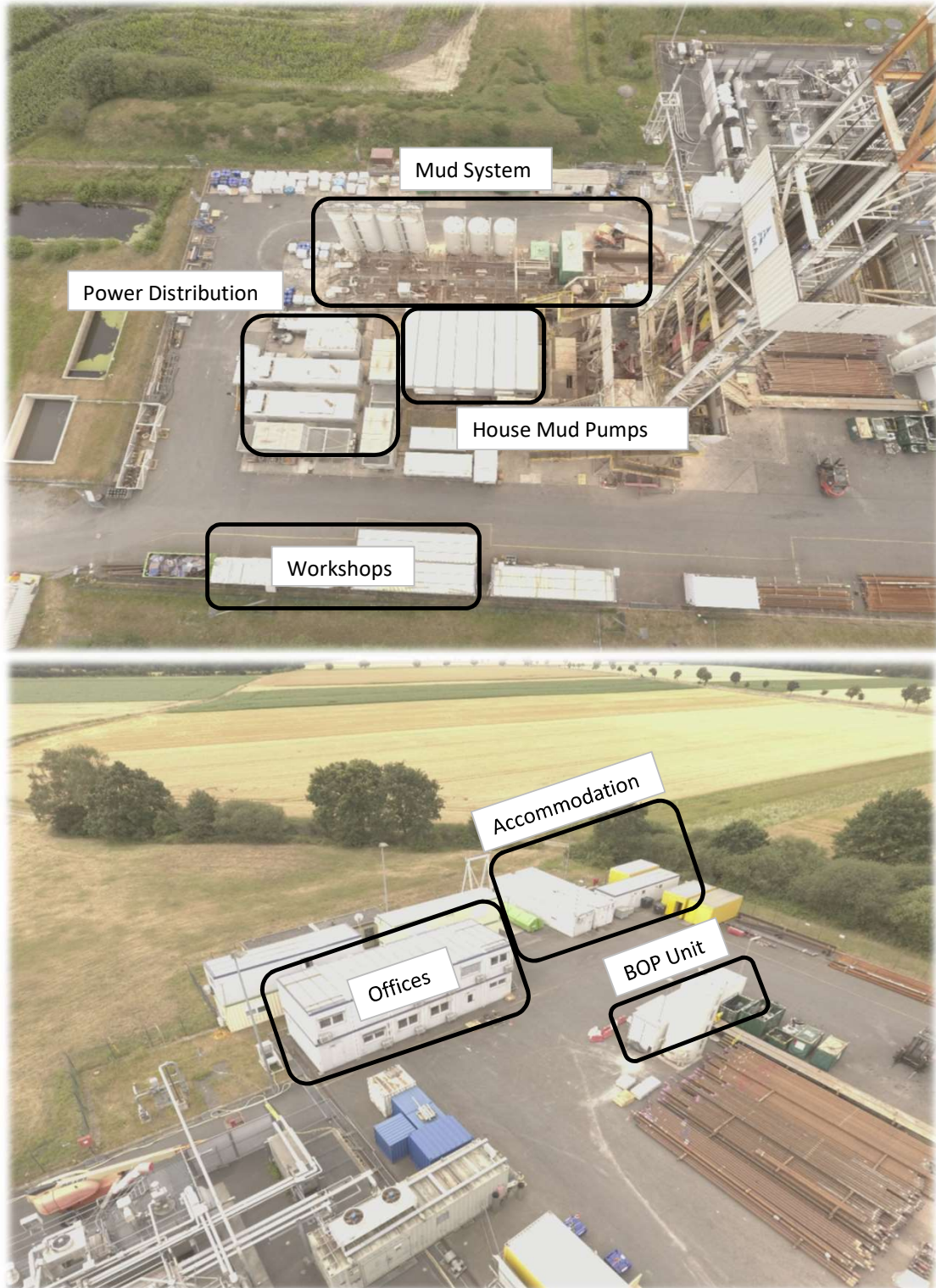
Telephone system (permanently installed) in: yes,
every room office building
Drillers Cabin
Monkey Board
Tank system
Pump house
Ex mobile phone for cementing service
Directional driller
Mud laboratory
Sampler
Mech. workshop / office
E-workshop / office
Porter
SCR Container
MCC 400V
Outdoor loudspeaker drilling location
Outdoor loudspeaker platform
Outdoor loudspeaker monkey board
(mobile): 3 mobile devices (ex)

O ADDITIONAL EQUIPMENT

O1 Cherry Picker

- Comments:**
1. The DRILLING CONTRACTOR is, pending the approval of the DRILLING OPERATOR, authorised to replace the devices mentioned above with devices which are of equal value or better technically.
 2. With catching tools which are to be set by the DRILLING CONTRACTOR (position J), these may only be devices with standard dimensions.
 3. The DRILLING CONTRACTOR shall arrange the casing tester for casings with API wall thicknesses in accordance with the piping programme.

Drilling Rig



Derrick/Substructure



Mast

| | |
|----------------------|--|
| Manufacturer | M.I.L. (Morinoak International Limited) |
| Type | 157' x 35' Universal Cantilever Swing Lift |
| Year of construction | 1997 |
| Clear height | (m) 47.85 |

| | |
|---|------------|
| Hook load (max.) for wire quality EIPS 1 1/2" | |
| with 14 lines | (kN) 5,900 |
| with 12 lines | (kN) 5,330 |
| with 10 lines | (kN) 4,530 |

| | |
|--|------------|
| Hook load (rated) for wire quality EIPS 1 1/2" | |
| with 14 lines | (kN) 4,070 |
| with 12 lines | (kN) 3,550 |
| with 10 lines | (kN) 3,020 |

| | |
|-------------|------------|
| Crown Block | |
| Rated load | (kN) 5,780 |

| | |
|--------------------------|------------|
| Racking capacity | |
| 5" DP incl. 400m DC | (m) 10,100 |
| 5 1/2" DP incl. 400 m DC | (m) 9,100 |
| 6 5/8" DP incl. 400 m DC | (m) 7,600 |

| | |
|----------------------|------------------|
| Stabbing Board | |
| Adjustable (from/to) | (m) 5.86 – 20.85 |
| Payload | (kN) 1.4 |

| | |
|---------------|-------|
| Escape System | |
| Manufacturer | Honor |
| Type | PED-6 |

Substructure

| | |
|--|---|
| Manufacturer | M.I.L. (Morinoak International Limited) |
| Type | 35' Swing Lift Self Elevating Sub-Structure |
| Year of construction | 1997 |
| Clear width | (m) 7.55 |
| Height Lower Edge Rotary Table | (m) 9.00 |
| Height Upper Edge Rotary Table | (m) 10.70 |
| DP Offload | (kN) 3,630 |
| Rotary Table load (max.) | (kN) 5,900 |
| Rotary Table load simultaneously with rotary | (kN) 3,630 |

| | |
|---|----------|
| BOP hoisting incl. radio remote control | |
| Load capacity | (kN) 396 |

Mud Pumps

| AkerSolutions™ | | | | | | | | | | |
|---|------------------|----------------------------------|------------------------------|-------|-------|-------|-------|-------|-------|-------|
| Performance chart - Wirth HP mud pump TPK 2200 | | | | | | | | | | |
| TPK 7 1/2"x14" / 2200 - 7500 PSI-Stroke 14" (356mm) | | | | | | | | | | |
| Liner size | inch | 7 1/2 | 7 | 6 1/2 | 6 | 5 1/2 | 5 | 4 1/2 | 4 | 3 1/2 |
| mm | | 190.5 | 177.8 | 165.1 | 152.4 | 139.7 | 127.0 | 114.3 | 101.6 | 88.9 |
| Max. discharge pressure | PSI | 3836 | 4403 | 5107 | 5893 | 6713 | 7600 | 8577 | 9653 | 10829 |
| bar | | 265 | 304 | 352 | 413 | 482 | 562 | 655 | 760 | 879 |
| Volume per stroke | US Gallons | 8 | 7.01 | 6.04 | 5.15 | 4.33 | 3.57 | 2.87 | 2.22 | 1.61 |
| Litres | | 30.44 | 26.52 | 22.86 | 19.48 | 16.37 | 13.53 | 10.91 | 8.44 | 6.08 |
| Pump speed | Max. input power | Discharge flow US Gallons / min. | | | | | | | | |
| SPM | KW | HP | Discharge flow Litres / min. | | | | | | | |
| 110 | 1640 | 2200 | 885 | 771 | 664 | 568 | 478 | 393 | 312 | 235 |
| | | | 3348 | 2917 | 2515 | 2143 | 1801 | 1488 | 1207 | 965 |
| 100 | 1491 | 2000 | 804 | 701 | 604 | 515 | 433 | 357 | 287 | 222 |
| | | | 3044 | 2652 | 2286 | 1948 | 1637 | 1353 | 1091 | 865 |
| 90 | 1342 | 1800 | 724 | 631 | 544 | 463 | 389 | 322 | 262 | 207 |
| | | | 2740 | 2387 | 2058 | 1753 | 1473 | 1218 | 991 | 791 |
| 80 | 1193 | 1600 | 643 | 560 | 483 | 412 | 348 | 286 | 236 | 188 |
| | | | 2435 | 2121 | 1829 | 1559 | 1310 | 1082 | 891 | 712 |
| 70 | 1044 | 1400 | 563 | 490 | 423 | 360 | 303 | 250 | 200 | 157 |
| | | | 2131 | 1856 | 1600 | 1364 | 1146 | 946 | 771 | 622 |
| 60 | 895 | 1200 | 483 | 420 | 362 | 309 | 260 | 214 | 174 | 137 |
| | | | 1826 | 1591 | 1372 | 1169 | 982 | 812 | 665 | 532 |
| 50 | 746 | 1000 | 402 | 350 | 302 | 257 | 216 | 179 | 143 | 112 |
| | | | 1522 | 1326 | 1143 | 974 | 819 | 678 | 552 | 442 |
| 40 | 596 | 800 | 322 | 280 | 242 | 206 | 173 | 143 | 113 | 89 |
| | | | 1218 | 1061 | 915 | 779 | 655 | 541 | 442 | 357 |
| 30 | 447 | 600 | 241 | 210 | 181 | 154 | 130 | 107 | 86 | 68 |
| | | | 913 | 796 | 686 | 584 | 491 | 406 | 332 | 267 |
| 20 | 298 | 400 | 161 | 140 | 121 | 103 | 87 | 71 | 57 | 45 |
| | | | 609 | 530 | 457 | 390 | 327 | 267 | 217 | 172 |

Based on efficiency
mech. efficiency

100%
90%

HP = Horse power (1HP=0.746kW)
SPM = Strokes / min.



Mud Pumps

| | |
|--------------|------------------|
| Count | 3 |
| Manufacturer | Wirth |
| Type | TPK 2200 |
| Drive | 2 DC motors each |

Available input power
each pump (kW) 1640

at piston/liner diameter: (inch) 5
max. pressure: (bar) 517
max. flow rate: (l/min) 1500

at piston/liner diameter: (inch) 7 1/2
max. pressure: (bar) 265
max. flow rate: (l/min) 3348

Top Drive



Top Drive

| | | | |
|----------------------|----------------------|----------|----------|
| Manufacturer | MARITIME HYDRAULICS | | |
| Model | DDM 650L-DC 2speed | | |
| Drive | electric | | |
| Output | (kW) | 735 | |
| Capacity | (kN) | 5,800 | |
| | | 1st Gear | 2nd Gear |
| Max. Torque | (daNm) | 7,570 | 4,930 |
| Continuous torque | (daNm) | 6,835 | 4,440 |
| Max. rev count | (min ⁻¹) | 154 | 237 |
| Continuous rev count | (min ⁻¹) | 104 | 161 |

Cherry Picker



Fork Lift



Drillers Cabin



SCR Container



Energy Distribution (SCR / MCC)

SCR Unit Manufacturer

(units)
(units)
(units)

BENTEC
2 SCR for Drawworks
3 SCR for Mud Pumps
1 SCR for Top Drive

Other systems/controls:

Drawworks Control MH Wirth
Top Drive Control MH Wirth
Bentec: Soft Pump/ACS/Soft Torque
MCC 690 V
Fest AG
MCC 690V / MCC 400V

Add. MCC Container Manufacturer

Iron Roughneck



Iron Roughneck

Manufacturer

Type

Torque

(kNm)

MARITIME HYDRAULICS

MH 1898 (BC251)

35/169

Compressors/Air Dryer



Compressors

| | | |
|---------------------------------------|---------|-------------|
| Number | (units) | 2 |
| Manufacturer | | Atlas Copco |
| Type | | GA18 VSP+P |
| Power (max.) | (kW) | each 18 |
| Working pressure (max.) | (bar) | 13 |
| Storage capacity | (l) | 1,500 |
| Air drying | | yes |
| Incl. Freeze protection and dew point | | |

Mud System



| MUD SYSTEM | | | | Mixing System | | Mud Condition Equipment | |
|--|-----------|---------------------------|--|---|------------------|--------------------------|---------------------------------------|
| Active System | | | | Mixing Tank 1 | | Shale Shaker | |
| Total volume | (m3) | 260 (not incl. mud silos) | | Volume | (m3) | Number | (units) |
| Shale Shaker Tank | | | | Number of compartments | (units) | Type | 4 NOV Brandt VSM 300 elliptical fixed |
| Volume | (m3) | 30 | | Agitators | (units) | Drive | (linear, elliptical, circular) |
| Number of compartments | (units) | 2 | | Power | (kW) | Moving angle | variable |
| Agitators | (units) | 2 | | Level monitoring with 3 radar sensors | | Vibration speed | for each 3 |
| Power | (kW) | 7.5 | | | | Power | (kW) |
| Sand Trap | (m3) | 10 | | D 2.2 | Mixing Tank 2 | Upper deck screen area | (m²) |
| Level monitoring with 3 radar sensors | | | | | | Lower deck screen area | (m²) |
| Suction tank | | | | Content | (m3) | Desander | 1 Mud Cleaner in 23" – Drill section |
| Number | (units) | 1 | | Number of compartments | (units) | Desilter | |
| Volume | (m3) | 60 | | Agitators | (units) | Number | (units) |
| Number of compartments | (units) | 2 | | Power | (kW) | Manufacturer | 1 DERRICK 416-T |
| Agitators | (units) | 4 | | Level monitoring with 2 radar sensors | | Type | 16 |
| Power | (kW) | 7.5 | | | | Diameter of the cyclones | (inches) |
| Level monitoring with 2 radar sensors | | | | D 2.3 | Pill Tank Number | Flow rate | (l/min) |
| Reserve tank | | | | (a compartment of the Reserve Tank) | (units) | 1 with 15m² | |
| Number | (units) | 1 | | Mixing Hopper | | Vacuum Degasser | |
| Volume | (m3) | 60 | | Number | (units) | Number | (units) |
| Number of compartments | (units) | 3 | | | | Manufacturer | 1 DERRICK D-1200 |
| Agitators | (units) | 4 | | Mixing Pumps | | Type | 277 |
| Power | (kW) | 7.5 | | Number | (units) | Flow rate | (m³/h) |
| Level monitoring with 3 radar sensors | | | | Manufacturer | | Dry Material Silo | |
| D 1.4 | Mud Silo | | | Type | (units) | Number | (units) |
| Level monitoring with 4 radar sensors | | | | Drive | (units) | Capacity | 3 |
| Number | (kg/dm²) | 4 | | Power | (kW) | Weighing device | 29 |
| Mud weight | (m²) | 2.5 | | Transfer Pumps | | | yes |
| Volume | | each 37.5 | | Number | (units) | | |
| Level monitoring with 4 radar sensors | | | | Manufacturer | | | |
| D 1.5 | Trip Tank | | | Type | (units) | | |
| Chamber volume | | | | Drive | (kW) | | |
| Remote control | (units) | 1 | | One pump via VFD to supply the Desilter | | | |
| Number of centrifugal pumps | (units) | 2 x 3.5m² | | Chemicals Conditioning Tank | | | |
| Type | (units) | Remote I/O with | | Content | (m3) | | |
| Power | (kW) | 2 | | Agitator | 1.5 | | |
| Level monitoring with 2 radar sensors | | 4" x 3" x 13" | | | yes | | |

Bulk Silos



Dry Material Silo

| | | |
|-----------------|----------------------|-----|
| Number | (units) | 3 |
| Capacity | m ³ /Silo | 29 |
| Weighing device | | yes |

Mud Silos



Mud Silo

| | |
|-------------------------------------|-----------|
| Number | 4 |
| Mud weight (kg/dm ³) | 2.5 |
| Volume (m ³) | each 37.5 |

Trip Tank



Trip Tank

| | | |
|--------------------------------------|------|---------------------------|
| Contents | (m³) | 2 x 3.5 |
| Circulation pump | | yes, 2 x 15kW |
| Display incl. alarm threshold value | | PC monitor drillers cabin |
| Linkage volume display | (m³) | PC monitor drillers cabin |
| Display of total linkage volume | | PC monitor drillers cabin |
| Display of total volume of last trip | | PC monitor drillers cabin |

Shale Shaker



Shale Shaker

| | | |
|------------------------|--------------------------------|------------|
| Number | (units) | 4 |
| Manufacturer | | NOV Brandt |
| Type | | VSM 300 |
| Drive | (linear, elliptical, circular) | elliptical |
| Moving angle | | fixed |
| Vibration speed | | variable |
| Power | (kW) | for each 3 |
| Upper deck screen area | (m ²) | 1.91 |
| Lower deck screen area | (m ²) | 2.44 |

Drawworks



Drawworks

| | | |
|--|-------|---|
| Manufacturer | | WIRTH |
| Type | | GH 2500 EG |
| Year of construction | | 1997 |
| Drive | | 2 DC motors GENERAL ELECTRIC GE-752 High Torque |
| Input power | (kW) | 1,840 |
| Line pull , 2 nd layer | (kN) | 532.3 |
| Auxiliary Brake | | Eddy current brake |
| Manufacturer | | BAYLOR |
| Type | | ELMAGCO 7838 |
| Anti-collision system (Automated Drawworks Control System) | | |
| Manufacturer | | BENTEC |
| Type | | ACS M-III |
| Feed Off System | | |
| Manufacturer | | BENTEC |
| Workspace | (m/h) | 0.5 – 63 |
| | (kN) | 2,452 |

BOP Unit



| | |
|--|---|
| BOP Unit | |
| Manufacturer | NCS |
| Type | BOP HPU-2X200-210-2000-400/50 |
| Series nr. | NCS-2012-10-03-004 |
| Total storage capacity | (l) 30 x 50l = 1500 l |
| Storage pressure | (bar) 210 |
| Hydraulic pumps | |
| Number | 2 x Axial piston pump |
| Type | V30D-140 RKN-1-1-04/LN-2/221450 |
| Flow | (l/min) 203 |
| 2. Independent supply of the locking system through: | |
| Emergency generator | Perkins |
| Type | GEP 65 - 2 |
| Performance data | 60 kVA with cos phi 0.8/400V/50Hz |
| Ring preventer pressure control valve | yes |
| Distributor pressure control valve | yes |
| Main control | |
| Number of stations | 7 |
| Remote controls | |
| Number | 2 |
| Location | Drillers Cabin as well as BOP control room |
| Number of stations | 7 |
| Remote control for mud pumps | yes |
| Displays | Pump strokes, DP pressure, Annular pressure, Autom. Choke incl. threshold settings |

Generator Sets



Diesel Motors

| | | |
|--------------|----------------------|----------------------------------|
| Number | (units) | 2(Additionally 2 back up motors) |
| Manufacturer | | CATERPILLAR |
| Type | | 3512-B |
| Power | (kW) | each 1,195 |
| at | (min ⁻¹) | 1,500 |

Generators

| | | |
|--------------|---------|--------------------------------------|
| Number | (units) | 2(Additionally 2 back up generators) |
| Manufacturer | | LEROY SOMER |
| Type | | LS 51 |
| Power | (kVA) | each 2,000 |

Flare



Mud Gas Separator with Flare

| | | |
|-------------------------|--------|--------------------------------|
| Separator | | yes |
| Flare height | (m) | 15 |
| Outer diameter | (inch) | 12 |
| Igniting device | | electrically with pilot burner |
| Length of inlet | (m) | 30 |
| Rated pressure of inlet | (bar) | 15 |

High Pressure Cleaner



High Pressure Cleaner

1 ATH in container, fixed piping system
with several taps