

NURICON ENERGY SERVICES (PRIVATE) LTD.

Is a member of NURiCON Group of Companies

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Company Overview

Nuricon Energy Services (Private) Limited (NESL), the largest Mud Logging service provider in Pakistan.

- ❑ Nuricon Energy Services (Pvt) Limited is a Mud Logging services company in technical collaboration with Petroservices GmbH.
- ❑ Nuricon Energy Services (Pvt) Limited mud logging cabins are skid mounted, pressurized, with certified eye pads.
- ❑ NESL is operating in Pakistan since 2006 and has become one of the largest mud logging company of Pakistan.
- ❑ Having 14 mudlogging units in Pakistan with 100+ well qualified and experienced employees.
- ❑ Worked in Pakistan with following Clients: OPL/OPPL, OGDCL, PPL, POL, MOL, MPCL, BP, UEPL, PEL, Hycarbex, Kufpec.
- ❑ Nuricon Energy Services (Pvt) Limited has successfully provided mud logging services at more than **500** wells in Pakistan.

Importance of Mud Logging

- ❑ Mud logging is a service that qualitatively and quantitatively obtains data from, and makes observations of, drilled rocks, drilling fluids and drilling parameters in order to formulate and display concepts of the optional, in situ characteristics of formations rocks with the primary goal of delineating hydrocarbon “shows” worthy of testing.
- ❑ The mud logging unit is the information center on the rig site to serve both exploration and drilling.

General Purposes

Formation Evaluation

Geology remains the foundation of all mud logging services. The mud loggers are the first and in some cases the only people who actually look at the rocks being drilled.

Gas Monitoring

From the earliest days, wellsite geological analysis involved looking for evidence of gas. Once the gas trap came into use, the drilled gas was analyzed with a sample which gives a basic indication of the percentage of combustible gases.

Operations Monitoring

The mud logging unit by its instrumentation monitor the basic drilling parameters: hole and bit depth, rate of penetration and the pump strokes (essential for tracking the lagged samples). The mud logging unit is therefore the only place on a rig where all the drilling and geological information is seen and recorded.

Safety Monitoring

One of the most important functions of a mud logging unit is safety monitoring. As the unit monitors data from all around the rig, including pit levels, return flow and gas in the mud (toxic gases such as H₂S as well as hydrocarbons), mud loggers have always been responsible for spotting potential dangers.

NESL has provided 548762 man hours without a single lost time.

Role played by Mud Logging Unit

- Collection of drilled rock cuttings which is geologically described, examined for any oil shows and then packed.
- Hydrocarbon gas monitoring while drilling,
- The monitoring of drilling fluid volume and to immediately inform the personnel in charge about any change in that volume.
- Confirming with the driller about any drilling breaks.
- The generation of mud logs and graphs during the drilling of the well, acquisition of the data and producing a final well report.
- The monitoring of drilling parameters through an array of sensors and informing well in time about anomalies.
- Monitoring the trip and updating a trip sheet. Generating swab/surge reports to monitor the trip speed to avoid any surging or swabbing effect on well bore.
- The detection and evaluation of the formation pressure and the hydraulic optimization.
- The mud logging unit considered the information Centre of the rig site as the unit participates in the monitoring of each and every rig operation.

Mud Logging Unit



Mud Logging Unit



Mud Logging Unit



FID Gas Detection System

The gas system is designed to provide a continuous reading of total hydrocarbons in a gas stream, while periodically performing a chromatographic separation of the sample to determine the composition of the sample gas stream C1 up to nC5 in less than one minute.

This is accomplished using a 10 port gas sampling valve with a 25 μ L sample loop in a thermostatted valve oven, a 1m (3') Hayesep-D packed column in a temperature programmable column oven, a total gas detector, an flam ionization detector and a built-in air compressor.



Gas Detection System

Gas Flow Control Panel

Nuricon Energy Services (Pvt) Ltd, gas flow control panel allows separate control of sample pressure, sample flow, carrier pressure and carrier flow, in addition to filtering of gas sample and carrier from any contamination.

The flow control panel is attached to a purge system for auto cleaning of the gas line. Alarm and pressure gauge facilitate checking, adjusting and controlling flow to have clean, adjustable and steady sample parameters.



Flow Control Panel

Hydrogen Generator

The gas generator will produce a constant stream of hydrogen at a pre-determined pressure and flow rate when connected to a suitable power supply and fed with a suitable quality of deionized water.

The hydrogen generator produces pure hydrogen (and oxygen as a by-product) by the electrolysis of water. The basic principle is the separation of water (H_2O) into separation oxygen (O_2) and hydrogen (H_2) using a technology called a Proton Exchange

Membrane (PEM). This technology allows hydrogen purity levels of 99.999% to be achieved.



Hydrogen Generator

QGM Gas Separator

QGM is an air powered gas trap. The bottom of the trap is submerged about two inches under the surface of the returning mud stream. The mud, tending to seek its own level, flows in the inlet in the bottom of the trap canister. Rotation of the motor driven impeller blade causes this mud to whirled around rapidly.

The centrifugal force of this whirling action causes the level of the mud to be raised around its periphery inside the canister until it flows out the discharge on the side of the trap. The depth to which the trap is lowered into the mud should be adjusted to give a continuous sample of 3 gallons per minute of mud flowing through the trap.



System Degasser

H₂S Gas Detector

H₂S gas detector is electrochemical sensors for the detection of toxic gases. These sensors generate an electrical current proportional to the actual gas concentration.

Programs for any gas and measuring range are permanently stored in the memory of the controller. The user friendly software program allows authorized personnel to select different configurations by a simple push of a button



H₂S Deector

Siemens Sirec D400

Siemens SIREC D400 is a chartless high end display recorder in 300 mm x 300 mm format with 12.1" Color TFT Display that supports up to 48 analog channels and up to 48 digital channels.

With more than 256K colors makes it easy to interpret process data and take action with the intuitive bar charts, digital values, trends or customized displays. The heavy duty durable touch screen provides easy data entry and rapid navigation through the menus. The recorder supports FTP, Mod bus TCP/IP (slave Data Acquisition mode), Web and Email standard) communications over Ethernet (DHCP port and Modbus RTU (slave mode) via an RS485 port.



Data Acquisition

Draw Work Sensor

PetroServices fabricates draw work sensor uses two inductive sensors detect the moving of the iron gear which installed directly on the draw work shaft. The draw work gear has a specific numbers of teeth and each inductive sensor is able to detect whether the metal of the serrated target is covering the proximity sensor face, or whether one of the gaps in the target is in front of sensing face.

The depth processing unit (Motrona) determines the absolute position of the hook taking into account the number of wrap turns on the drum and the cable position. The sensor is used to detect the kelly position and the direction of the kelly movement (up or down).



Draw work sensor

Hook Load Sensor

The line tension transducer is mounted near the deadline anchor of the rig wire rope system. Hook load is measured by monitoring the amount of tension created by the load of the top drive system or swivel and kelly.

The sensor is independent of all drilling contractor systems and hence does not affect nor depend on the functionality of the hydraulic system of the rig. Line tension transducer provides a 4 - 20 mA loop powered electrical signal output proportional to a wire rope's single line load up to 100,000 lbs.



**Hook load line
tension sensor**

Pressure Sensors SPP/CP

The Hammer union pressure transmitter has been designed for use in extremely harsh environments in both on shore and off shore oil drilling operations where high shock and vibration is likely to be encountered.

The Hammer Union SPP pressure sensor has range 0-6000 psi. It is also available for casing pressure 0-15000 psi range.

The low volume oil fill technology allows response times of faster than 2 kHz. The field proven 4 to 20 mA electronics, packaged in a rugged enclosure, provides power supply regulation, reverse polarity, overvoltage and EMC protection.



**Hammer Union
Pressure sensor**

Hydraulic Pressure Sensor CP/SPP/HKLD

The hydraulic pressure transducer is connected to oil die frame by high pressure fast connection, the measured pressure (input) is transformed into a direct current 4 - 20 mA (output).

The process pressure causes a resistance change in the sensor element via the stainless steel diaphragm. This change is converted into an appropriate output signal and outputted as measured value.

This type of pressure transducer can be used in measuring casing pressure (15000 psi), stand pipe pressure (6000 psi) and hook load (1500 psi).



**Hydraulic pressure
Sensors**

Rotary Speed Sensor

Rotary speed proximity sensors are entirely solid state electronic controls that contain no moving parts to wear out as do mechanical switches.

Rotary speed sensor is inductive sensor, it senses the iron pieces closed to it (as a magnetic switch) and gives the signal as up & down direct current voltage.

The rotary speed sensor is installed beside the rotary shaft to detect the movement of the rotary. Its actual sensing distance is 13.5-16.5 mm, with switching frequency of 150 Hz.



**Rotary speed
Sensors**

Rotary Torque Sensor

The ISC current transducer provides a Hall Effect sensor with an integrated signal conditioner.

Application flexibility is provided by a wide variety of input current ranges and output signal types. Hall Effect current measurement is a non contact technique that measures the magnetizing effects of current flowing in a conductor. Its range is 0-1000 A.

CTA signal conditioning provides the excitation current that the CTL Hall Effect sensors requires as well as amplifying the low level signal into a more typical signal. The CTA is calibrated to the output of the specific CTL selected.



Torque-Sensors

Pump Stroke Sensor

A mechanical switch (limit switch) is used to calculate the number of strokes per minute, the limit switch usually fixed on the pump latch beside the pump movement part. SPM sensor is fixed by L-shape holder its length can be changed by plots and the holder is fixed to the pump body using J clamp.

The two wires pump stroke sensor is connected to frequency converter unit. The input signal sequence is evaluated and converted into a frequency by a microcontroller in accordance with the cycle method. The microcontroller calculates a voltage or current proportional to the input frequency and produces it with a digital analog converter in respect to the selected measurement range's limit value.



**Pump Stroke
Sensors**

Mud Pit Volume Sensor

The ultrasonic mud pit level sensor is used to measure the volume of the mud inside tanks, this sensor actually measure the distance between the sensor's head and the mud level inside the tank.

Sensor's head send an ultrasonic echo and receive it after being reflected by the surface of the mud, by counting the time between sending and receiving of ultrasonic pulses the distance between the sensor's head and the mud surface can be calculate. This distance will give indication of change in mud pit level as the mud tanks dimensions are constant.



**Mud pit volume
Sensor**

Mud Temperature Sensor

Platinum temperature sensors use the effect of the temperature dependence of the electrical resistance of the noble metal platinum. Since the electrical resistance increases with rising temperature, we speak of a positive temperature coefficient for such temperature sensors. PT100 temperature sensor is used to measure the mud temperature in or out.

The variation of the electrical resistance of metals with temperature is very often employed for the electrical measurement of temperature since the electrical resistance increases with increasing temperature.



**Mud Temperature
Sensor**

Paddle Mud Flow Sensor

The flow sensor monitors mud flow through the return line to the shaker using a paddle type sensor. The assembly is mounted on the return line with the paddle extending through a 9.25 x 2.50 inch cut-out in the pipe into the mud flow.

Deflected by the force of the mud flow Mud flow inside flow line causes deviation of the paddle resulting difference in gap between inductive sensor and a special designed metallic part of the sensor, generates output of 4 to 20 mA, which is directly proportional to paddle deviation i-e increasing mud flow in the line will increase mA. The signals from the flow sensor are registered on the mud flow indicator providing the operator with indications of mud flow changes and initial mud flow returns during trips.



Mud flow-Sensor

Microscope

Head 360 degree rotatable 45 degree inclined binocular, eyepieces 30mm super wide field high-eye point WF10X/20mm, objective zoom range: 0.67X-4.5X, using the Barlow lenses working distance 4" (100mm) diopter adjustment: +/- 5dp interpupillary distance: 2-3/16" - 2-15/16"(55-75mm) round plate: 3-3/4" (95mm) in diameter, stand: 10" x 7-7/8" x 10.75" (254 x 200 x 275mm), Illumination 56-LED ring light power input: 110-240V, 50-60HZ, automatic switching accessories: paired eye-caps weight: 5.5kg, feature: 7X-90X zoom magnification power with crisp sharp images, super wide field high-eye point optics, wide field of view 4" (100mm) working distance, sturdy all-metal pillar stand, powerful 56-LED ring light with dimmer.



Microscope

Ultraviolet Viewing box (Fluoroscope)

Ultraviolet–light box with 2 wave lengths lamp for viewing fluorescence and evaluating oil shows (UV Fluoroscope). Oil shows detection and grade determination can be done through viewing the washed rock samples under Ultraviolet light. It provides a safe way against ultraviolet light contact through a highly protection and a double glass viewing window. The easy protected inlet openings provide an easy way to add hydrocarbon solvent to the rock sample. A portable UV scanning device also available for cores.



Fluoroscope

Shale Density Meter

The shale density meter is an instrument used to measure the density of shale. This type of analyzer of shale consists of organic glass cylinder, scale subdivision in the mirror plane, fixing mirror bracket, stainless steel pole, floater, damping hammer, zero setting knob and so on. Technical indicators Measuring range: 1-3g/cm³
The minimum sample weight: 0.05g Resolution: 0.03 g/cm³



Shale density kit

Calcimetry

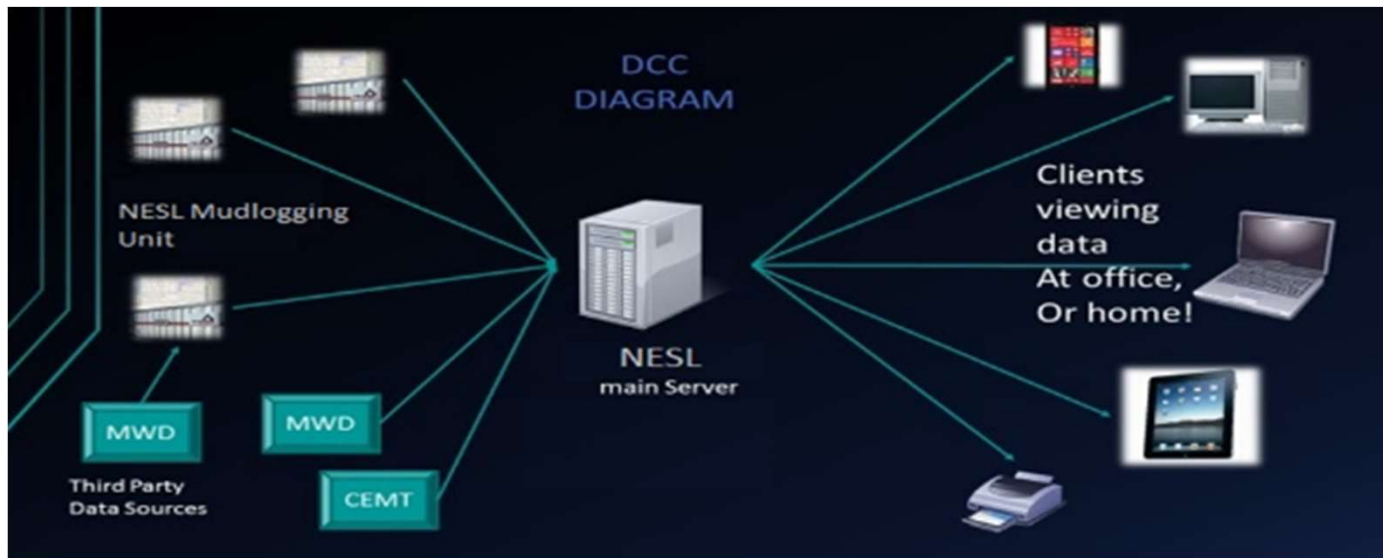
In Calcimetry, calcium carbonate and magnesium carbonate are reacted with 10 percent Hydrochloric acid in a sealed reaction cell to form CO₂. As the CO₂ is released, the pressure build up is measured using a pressure sensor and is online recorded. The calcium carbonate content of cutting is determined by treating a 1 gm dried cutting specimen with HCL in the reactor cell. The resulting pressure increase then measured and compared to the calibration curve to determine the total weight of CaCO₃ in the test sample.



Calcimetry

Data Communication Center (DCC)

- ❑ DCC WITSML data solutions provide an all inclusive solution for real-time data delivery needs.
- ❑ Examples for the type of data that can be simultaneously managed and displayed include drilling sensor information, mud logging data and measurement while drilling (MWD/LWD) data in real-time directly from the various service provider acquisition systems at the well site.
- ❑ These data can then be merged by the system to produce logs on a time or depth based index.



Data Communication Center (DCC)

Key Features:

- Data communication center supports different types of well information standard format including
- WITS O and WITSML version 1.3.1.1 and 1.4.1.1
- Data collection and aggregation from multiple sources insures complete overview of different rig activities.
- Functions through a web browser with no installation issues or licensing costs.
- All data is stored and can be retrieved anytime for analysis.
- Handles multiple wells across multiple servers simultaneously.
- User programmable graphical interface for flexible customization.

Optional Services

- Early Kick Detection System (EKDS)
- X-Ray Diffraction / X-Ray Fluorescence (XRD/XRF) sample study/analyze
- Invisible Lost Time (ILT)- Drilling rig performance optimization through third party.
- Stand Alone Mass Spectrometry (Field Service)

NESL Safety Statistic

ITEM	RECORD	REMARK
Onshore Operation days	4850 Days	
Offshore Operation days	0	
Total Man-hours Onshore & Offshore	548762 Hours	
Kilometers Driven	50880 Km	
Vehicle Accident Record	0	
Accidents	0	
Fatalities (FAT)	0	
Permanent Total Disability (PTD)	0	
Medical Treatment Case (MTC)	0	
Lost Workday Case (LWC)	0	
Restricted Work Case (RWC)	0	
Lost Time Injury (LTI)	0	
Near Miss	2	
Training Hours	2800 Hours	

