QEMSCAN WellSite

Unprecedented cuttings analysis in a field-tested solution for the well site

QEMSCAN® WellSite is a novel cuttings analysis solution designed for integration into advanced mudlogging services (AML) provided by surface logging companies with a vested interest in improving the quality, consistency and value of their mudlogging services to the oil and gas industry.

QEMSCAN WellSite can quickly separate and classify rock types (lithologies) represented in a cuttings sampling interval with much greater accuracy, mineralogical detail and textural resolution than existing optical cuttings description methods. It permits a highly detailed petrographic analysis of cuttings matrix properties such as clay type, matrix density or grain size, on a lithology and lithofacies basis that is not provided by bulk cuttings analysis solutions such as LIBS, XRF or XRD.

The product platform is based on a rugged and mobile Scanning Electron Microscope (SEM) equipped with X-ray detectors (EDS) and QEMSCAN automated petrography capabilities. Field tests in Papua New Guinea and off-shore Qatar have demonstrated the ruggedness of the solution and the ability of service providers to integrate near real-time data acquisition, delivered by QEMSCAN WellSite, into existing around-the-clock mudlogging workflows. The solution includes a rapid sample preparation and analysis workflow, along with global application and service support.

KEY BENEFITS
Cuttings presented in 2D cross section mounted in robust resin blocks are a convenient way to handle and archive cuttings samples, making them readily available for complementary analysis at a later time.
Data collection is automated, quantitative, repeatable, consistent between operators, and delivers superior detail for lithology classification and subsequent data analysis.
Rather than averaging cuttings properties across the entire sampling interval, including contaminants such as drilling additives, QEMSCAN WellSite data provides unprecedented insight into lithology variability from cuttings for any given sampling interval, and can quantify the mineralogy, density, relative volume and textural properties, such as quartz grain size, for each lithology independently.
The visual data (petrographic images) are intuitive and readily accessible to a wide range of professions at the rig (e.g. geologists, petrophysicists).
Petrographical measurements can now be taken to the rig and directly help time-critical operations as opposed to shipping samples to central laboratories with time-to-data implications and logistical constraints.

Essential Specifications

System

- Scanning Electron Microscope (SEM), rugged, mobile
- Dual Energy Dispersive X-ray spectrometers (EDS)
- QEMSCAN data acquisition, analysis and reporting capabilities

Sample preparation equipment

- Scales
- Microwave oven (optional)
- Mixer
- Diamond saw
- Carbon coater
- All units placed on a benchtop
- All units standard and certified commercial items

Samples and throughput
- Sectioned 30 mm diameter resin blocks, carbon coated
- Typical sample collection and preparation time: 25 minutes
- Maximum 24-hour throughput: 55 samples (PNG field test)
- Typical number of cuttings per sample: 1,000 – 2,000

Data statistics, throughput and analysis
- Up to 400,000 measurements per sample
- Typical stepping (pixel) interval: 20 µm
- Minimum stepping (pixel) interval: 1–5 µm, selective during drilling downtime
- Typical sample analysis time: 25–35 minutes
- Mineral analysis at each point using QEMSCAN Species Identification Protocol (SIP)
- Digital screening – i.e. image-based removal of fines and drilling mud typically < 63 µm
- Contextual screening – i.e. particle-based removal of cavings, swarf and drilling fluid additives
- Predefined and customizable lithology classification
- Data on a drilling sequence and/or lithology basis:
  - Petrographic images retained for each sample
  - Modal mineralogy
  - Clay typing – swelling clays, radioactive clays, glauconite/micas
  - Average quartz grain size
  - Matrix density – calculated
  - Elemental chemistry / ratios – calculated
  - Traces: pyrite, apatite, other heavy and/or indicator minerals

Preconfigured reports
- MapView – providing petrographic image for each sample
- MinLog – modal mineralogy (volume or mass) for selected sample sequences, including clay mineral, feldspar and trace mineral quantification
- LithoView – cuttings images for all lithology classes
- LithoLog – lithology classes contribution (volume or mass) for selected sample sequence
- DensityLog – inferred matrix density for selected sample sequence
- SizeLog – average quartz grain size (or cuttings size) for selected sample sequence
- LithoMin – modal mineralogy (volume or mass) for selected lithologies
- LithoProp – numerical lithology classes properties for selected sample sequence
- LithoQtzGSD – average quartz grain-size distribution reported in USGS-altered size categories for selected lithologies
- Return – return (volume or mass) of drill cuttings, swarf, and (solid) drilling fluid additives for selected sample sequence
- Stats – overview of measurement statistics for selected sample sequence

Retrospective data interrogation
- Datastores (databases) can be interrogated retrospectively for geological data not assessed at the well site using off-line QEMSCAN WellSite software licenses.

Transport Specifications
- Self-contained SEM unit, 76cm wide x 89cm deep x 140cm high, 320 kg
- Permanent base plate with castors and forklift tubes
- Splash waterproof during transit
- Unit can be secured for transport
- Unit can withstand 15 cm drop during transit
- Unit uprights itself when tipped < 15 degrees
- Unit fits through 32-inch wide door
- Unit can be secured when at location
- Supports storage in temperatures of -7 to 38 °C

Installation requirements
- Stable operation in 10 – 32 °C ambient temperatures
- Stable operation when humidity ≤ 80%, non-condensing
- Power: 240V AC
- Vibrations: 130 µm/s RMS ≤ 30 Hz; 130 µm/s RMS > 30 Hz
- Electromagnetic: < 300 nT synchronous

Certification and safety
- 2006/95/EC Low Voltage
- 93/68/EEC CE Marking

Typical consumables
- Screens – 2mm & 63 µm
- Epoxy
- Moulds
- Saw blades
- Carbon rods
- SEM filaments

Support
- Spares kit included
- 24 / 7 2nd line service support from NA, EUR and AU
- 2nd line application support from Brisbane AU

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