Fluid Inclusion Technologies

dq1000®

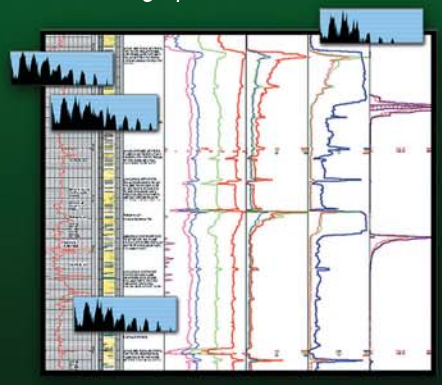
Mass Spectrometer Wellsite Gas Analyzer…*

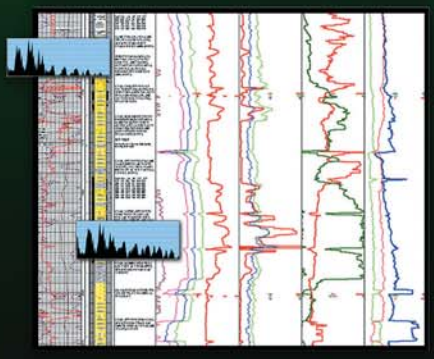
*The **dq1000®** "**divining quad®**" is a revolutionary concept in Wellsite Geochemistry and the first commercially available implementation of Mass Spectrometry for on-site, real-time formation fluid analysis and evaluation. Conceptually, the dq1000® is similar to conventional equipment (i.e., hot-wire + GC), in that it continuously analyzes volatiles extracted from the drilling mud and correlates them with depth. But here the similarity ends. At the heart of the dq1000® is a quadrupole mass analyzer which, in addition to performing the usual Total Gas + C1-C5 analysis, is capable of detecting C6-C10 hydrocarbons (i.e., hexane, heptane, octane, etc.); distinguishing among paraffins, naphthenes and aromatics; and monitoring a variety of water-soluble species such as acetic acid, toluene and benzene, and inorganics including hydrogen, helium, nitrogen, carbon dioxide, oxygen, argon and sulfur-bearing compounds. Correlation of these geochemical indicators with available drilling parameters and lithologic data allow real-time evaluation of Pay, Wetness (e.g., Pixler Ratios), Petroleum Type and Quality, Reservoir Compartmentalization, Fluid Contacts, Seals, etc.*

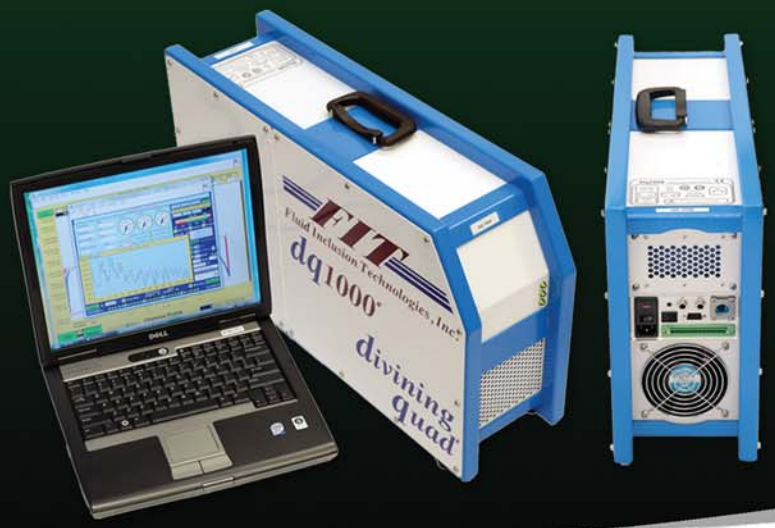
*The **divining quad®** is a portable, fully-automatic, stand-alone analyzer. Its modest size, weight and electrical requirements facilitate deployment in even the most restrictive environments. Sensor inputs on the dq1000® monitor penetration, circulation, and pump strokes (any of which can also be read from a WITS-enabled local network) to derive Depth, ROP and Lag for the preparation of geochemical logs. While drilling, analytical results may be viewed on-screen locally or remotely and are always available for immediate LAS import into commercially available graphics packages. Bi-directional communication can be enabled over LAN satellite and the Internet. The dq1000® is effective in both water and oil based (including diesel) drilling operations.*

The dq1000® is user friendly requiring minimal instruction for setup, operation and routine maintenance. The system has produced continuous, high quality data with minimal operator intervention for months at a time. Unlike FID detectors used in other gas analyzers, no auxiliary gases are needed thereby reducing costs and safety concerns. Mass Spec Analysis eliminates HC/CO2 interference - a common problem with many detectors leading to serious underestimation of hydrocarbons in some cases. The dq1000® accurately distinguishes mud gas from atmosphere allowing automated (and remote) monitoring of gas trap/extraction line performance. Optional two port operation allows evaluation of hydrocarbon recirculation and potential mud additive interference.

**PATENT US 7210342B1 & US 7395691B2*







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FIT
Innovations in Petroleum Risk Management

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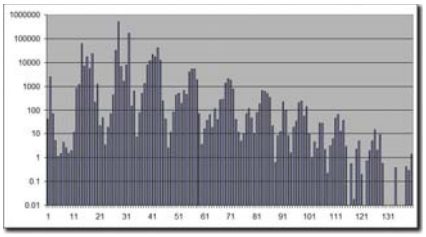
The dq1000® Quadrapole Mass Spectrometer

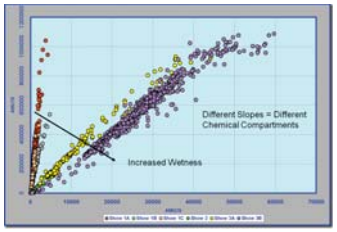
The dq1000® is a portable quadrapole mass analyzer used on drilling wells that analyzes a range of petroleum species and other organic and inorganic compounds. The dq1000® delineates petroleum type, water saturation, fluid contacts and seals to a much greater extend than with conventional instrumentation.

Analysis



- *C1-C10 petroleum species; standard gas ratios*
- *BTEX compounds and organic acids*
- *Inorganics including N2, Ar, O2, H2O, CO2, He, and H2*
- *Sulfur bearing compounds including SO2, COS, and CS2*
- *Formation gas vs. drilling mud and additives*
- *Bit generated gas*
- *90 second cycle time; 10 ppb sensitivity*
- *Depth-based and time-based data*

Applications



- *Pay delineation; fluid contacts*
- *Petroleum type and quality*
- *Porosity, permeability*
- *BTEX halos (proximity to pay) and Sw*
- *Compartmentalization*
- *Seals, fractures and faults*
- *Sweet spots in unconventionals*
- *Practical data to improve well completions*

Technical Specs

- *Dimensions: 26 x 7.5 x 15 inches*
- *Weight: 51 lbs (portable)*
- *Power: 85-264 VAC (3.0-1.5 amp), 47-63 Hz (International)*
- *LAN satellite and Internet enabled*
- *Sensors: Depth, Circulation, and Pump Strokes*
- *Adjustable cycle time: 15s - 360s (120s nominal)*
- *Analysis: Dual (differential) or Single Port Gas Stream*
- *Interface for Isotech's isotube autoloader*