Fluid Inclusion Technologies, Inc. is a petroleum industry service company that specializes in laboratory analysis of trapped fluids in rock material, and advanced borehole gas analysis on drilling wells. The ultimate goal of these services is to enable clients to address petroleum systems and reservoir characterization problems. Based in Broken Arrow, Oklahoma, USA, FIT was established in 1997 as a spinoff of Amoco Production Research. To date, FIT has analyzed thousands of wells from around the globe.

**Fluid Inclusion Stratigraphy (FIS)™** Patented Technique that allows rapid analysis of formation fluids trapped as inclusions in cuttings, core or outcrop samples. The procedure employs quadrupole mass analyzers attached to an automated, high-vacuum sample introduction system and the analytical results are unaffected by mud type or fluid balance while drilling.

- **FIS** — is one of the most broadly applicable geochemical techniques available. Virtually any question that involves the present or past distribution of petroleum, its chemical characteristics, and relationship to rock/pore system can be addressed using FIS.

- **Analysis** — of each individual sample in vacuum environment via mass spectrometry. Quantitative analysis of C1–C13 petroleum species, BTEX compounds and organic acids, sulfur bearing compounds including H2S, SO2, COS, and CS2 with depth plots of species and relevant gas ratios.

- **Sample Requirements** — Cuttings, core and/or outcrop samples of any age, type or quality. 2-5 gms washed, spacing 1–30 ft (3–10 m) for cuttings; 1 ft (0.5 m) for core.

- **Deliverable** — FIS report contains the results of mass spectrometric analysis of each sample, depth profiling of critical volatile species, preparation, optical evaluation & photo documentation of thin sections from anomalous FIS zones and interpretation of all data.
**Fluid Inclusion Stratigraphy (FIS)™**
Application of FIS to Source Analysis and Unconventional Reservoirs

- Evaluate Source Rock maturity using standard gas ratios, empirical FIS chemical relationships and chemometrics
- Correlate Gas Chemistry with TOC for mature, organic rich rocks
- Predict Produced Gas Chemistry in shales from unpreserved cuttings
- Identify Sweet Spots in unconventional reservoirs (pilot and laterals)
- Verify Wellbore path and define compartments

**Fluid Inclusion Stratigraphy (FIS)™**
Application of FIS to Tight or Fractured Unconventional Reservoirs

- Identify Sweet Spots in unconventional reservoirs (pilot and laterals)
- Verify Wellbore Path and define compartments
- Predict Produced Gas Chemistry in shales from unpreserved cuttings
- Evaluate Charge History, fluid type, saturation state, API gravity

**Fluid Inclusion Petrography and Microthermometry**

Fluid inclusions contain information that can be translated to temperature, pressure and compositional constraints.

**Petrography:** Thick polished slides evaluated for fluid inclusion populations, abundance, characteristics, fluorescence colors, kerogen, and bitumen.

- Timing of fluid implacement, Multiple hydrocarbon pulses, Qualitative API gravity estimation, Fluid contacts, Petroleum type and quality, Paleocharge, Kerogen abundance and type, Hydrocarbon staining/bitumen presence

**Microthermometry:** Quantitatively determines API gravity, fluid trapping temperatures, hydrocarbon saturation state, hydrocarbon phase, and salinity.

- Quantitative API gravity, Temperature of oil implacement or cementation, Reservoir salinity, Petroleum type and quality, Petroleum saturation, Presence of gas cap, Maximum burial temperature, Thermal maturity
**RockEye™**
High resolution photographic profile of the entire well bore lithology in both visible light and UV fluorescence images of cuttings and cores

- A Visual Record of the exact sample aliquot that was analyzed via FIS and/or PDQ-XRF
- Photo resolution is great enough to allow information to be obtained at the individual grain level
- Photos Allow Volatile Chemistry and chemical stratigraphy trends to be placed into lithostratigraphic context without resorting to calculated rock types or well site sample descriptions
- Add-on Module Allows FIS data to be related to optically recognizable lithologic and textural features including characteristic mineral fluorescence
- Photo Records are Critical Elements to the data package, being more transportable than the samples themselves, and surviving even when sample has been depleted, unintentionally destroyed or misplaced

**PDQ-XRF™**
High speed elemental profile of the entire well bore

- Provides the lithologic/stratigraphic framework into which formation fluid chemistry can be placed
- Designed to be used in conjunction with FIS
- XRF Evaluates more than 30 major, minor, and trace elements, with the ultimate goals of estimating mineralogical components, and establishing chemical marker horizons that can be correlated from well to well
- Data Contains Information Relevant to Depositional environment, diagenesis, facies and provenance
- Applicable to Rocks of Any Age and Type, thus allowing it to be effectively integrated with biostratigraphic information, and to be used where such information is not available

**Multi-client Regional Geochemical Evaluations**
FIT conducts non-exclusive regional evaluations, generally involving 10-30 wells within a limited geographic area, typically tied to specific lease sales or drilling activity. FIT generates these evaluations on risk, allowing a cost-effective product to be shared among participating companies. A standard study will include FIS, petrography and microthermometry, and a summary of results and mapping of variables in stratigraphic context.

- F.I.T. current regional studies include: Deep Water Gulf of Mexico, East Coast Canada; Barents Sea; Norwegian Sea; UK North Sea (WOSI); Irish Sea; Offshore and Onshore Libya; East Java Sea; Otway Basin, Australia; Ghana; Orange Basin, South Africa; Egypt; North Falkland; Offshore Uruguay, Viet Nam, and more…
**dq1000™**
**Mass Spectrometry Wellsite Gas Analyzer***
- Real-Time Applications – on-site, 24/7 real-time formation fluid analysis and evaluation
- Effective In Both – water and oil based (including diesel) drilling operations
- Portable - modest size, weight, and electrical requirements together with LAN, Internet and Satellite networking facilitate deployment in even the most restrictive environments
- Fully-automatic – Centralized server provides automated off-site data archival, retrieval and remote monitoring. Sensor monitors penetration, circulation, and pump strokes which can be read from a WITS-enabled local network to derive Depth, ROP and Lag for the preparation of geochemical logs
- Stand-alone - While drilling, analytical results may be viewed on-screen locally or remotely and are always available for immediate LAS import to commercially available graphics packages
- User Friendly - requires minimal instruction for setup, operation and routine maintenance
- Discriminates - C1-C10 Hydrocarbons, Paraffins, Naphthenes, Aromatics, Organic Acids, Inorganics (CO2, He, N2, O2, H2, etc.), Mud Additives
- Reduced Cost & Improved Safety - no auxiliary gases are needed resulting in reduced costs and improved safety

*PATENT US 7210342B1 & US 7395691B2

**Gas Cannibal™**
**Constant Volume Pneumatic Gas Extractor***
- Auto Leveling – Proactively adjusts to mud level changes before they can adversely affect observed sample gas chemistries
- Fully Automated – Continuous long term unmanned operation 24/7
- Universal Operation – Can be used in conjunction with any well site gas analyzer & flow system
- Rugged Construction – Sealed bearings, explosion proof electric or air driven agitator motor, aluminum, plated steel and stainless steel design
- Modular Design – Controller is of modular design allowing for change out in minutes as well as having components sealed thus allowing unit to be wash-down safe
- Wide Range Height Adjustment – 12” automatic mud height compensation plus 7” manual adjustment allows for a full usable range of 19”
- Small Footprint – Fits into 8” diameter opening in header tank

*PATENT US7794527B2

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