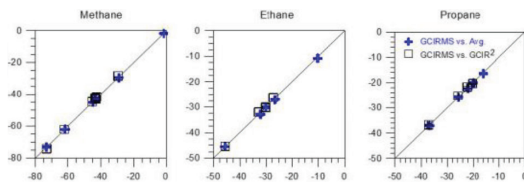


The GC-IR² is the first compound specific isotope analyzer for on-site evaluation of $\delta C_1 - \delta C_4$ carbon isotopes and hydrocarbon concentrations for $C_1 - C_{6+}$ while drilling.

Reservoir Group's cost effective solution utilizes the Paladin GC-IR² to provide carbon isotope ratios directly from the wellsite. Carbon isotope analysis is generally carried out in the lab with long turn around times adding additional costs in collection, storage, shipping, and time for this analysis. The GC-IR² analyzer is the first of its kind to operate in the field giving high precision $\delta^{13}C$ values for C_1 , C_2 , C_3 , and C_4 along with $C_1 - C_{6+}$ hydrocarbon concentrations using Hollow Waveguide and Quantum Cascade Laser patented technologies. The real time application of the GC-IR² is pivotal for time sensitive decisions in exploration or production applications.



Protocols:

- Unmatched value relative to sample density for carbon isotope evaluation during drilling.
- Safeguards and calibration checks ensure accuracy and precision comparable to a lab based GC-MS.
- Calibration checks run every 4 hours ensuring accuracy and precision using internationally accepted round robin standard.
- Integrated acquisition software monitors the instrument's operating parameters, as well as environmental conditions inside and outside of the trailer.
- Updated $C_1 - C_4$ isotope profile plotted daily included with service.

Technical Specifications			
Measures	Cycle Time	Concentration	Precision
$\delta^{13}C_1 - C_4$ at $\sigma = <0.3\%$	5 minutes per sample	Range.1-100%, down to 100ppm	$\sigma <0.3\%$ for GC peaks
Column Temp	Pressure Carrier Gas	Dimensions	Power Consumption
71°C start	0.11 MPa	51.5"h X 36"d X 23.5"w	110v/220v AC, Average 1kW, Peak 3kW

GC-IR² in Demanding Applications for

- Production Allocation
- Reservoir compartmentalization
- "Sweet Spot" identification
- Organic Thermal Maturity
- Geosteering
- Permeability studies