



PICO ENERGY
Technologies LLC



WIRELINE OPEN HOLE LOGGING TOOLS

The background image shows two men in orange safety gear, including hard hats and reflective stripes, leaning over a table. They are looking at several sheets of paper, likely technical drawings or data sheets. The scene is set in what appears to be an industrial or office environment. The overall color scheme is dominated by shades of orange and red, creating a sense of energy and focus.

***“We are what we repeatedly do.
Excellence, then is not an act but a habit.”***

–Will Durant

Why not?

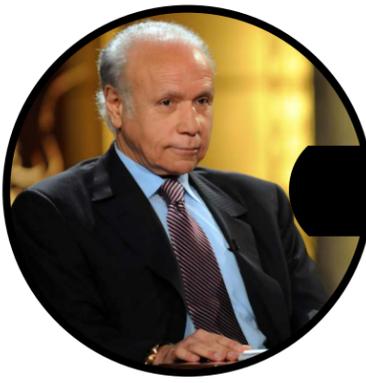
Why not develop oilfield tools and equipment that are superior in their functionality, differentiated from the competition, and cost-effective? Why not manufacture, train and operationally support the use of this high quality technology? Why not strategically use our technical expertise to support other energy group members.

PICO Technologies was conceived to answer that question as a subsidiary of PICO Energy Group since 2008 located in Houston, TX and the technology arm of the group, currently responsible for developing “fit-for-purpose”, high quality and cost efficient solutions that address the operating needs of the E & P industry: delivering patented designed proprietary Openhole wireline logging tools and Production optimization control systems for Progressive Cavity Pump systems, as well as Production development and management of other Projects Like PICO IV...

PICO Technologies provides a High Standard Technology with proven capabilities Delivering Cost Efficiency for a Changing Market inspired by the Gearhart Model – High Quality Technology in Massive Production leads to a meaningful Market share.

“I got it in my blood”

–Marvin Gearhart



Message from the Chairman

Eng. Salah Diab Chief Executive Officer

PICO Group was founded in 1974. A modest beginning indeed, it has been an exciting 40 years. Today, PICO Group remains the Egyptian service leader, with a lead brand and operations in different diverse segments through independent entities in Real Estate, Agriculture, Food, Engineering Services & Trading, Private Equity Investments, Petroleum Services, and Exploration & Production for Oil & Gas.

PICO Group has grown in different market segments it operates in with offices in the Middle East, Europe, United States, and Mexico; the Group employs over 5,000 people...

PICO Energy Group is a leading Egyptian operator of mature oil & gas fields and a provider of fit-for-purpose petroleum services. The E&P Division is focused on the development of mature fields with an international network; a recognized specialization in redeveloping mature fields, and a strong portfolio of assets, the E&P division expects to increase to 65,000 BOEPD by 2016. Meanwhile, the Services Division, operating under PICO Petroleum Services ("PPS"), is expanding beyond the Middle East into the Gulf of Mexico. PPS is comprised of distinct, independent, integrated companies, including: PICO Petroleum Integrated Services, PICO Technologies, PICO Marine Services, PICO Logistics Services, and PICO Research & Analysis. With the support of a specialist technology research & development subsidiary PICO Technologies LLC "established in 2008" in Houston, Texas, PPS is capitalizing on its proven know-how in servicing mature oil and gas fields, providing clients with innovative ideas and fit-for-purpose solutions.

So much for our past and present...What about PICO ENERGY's future?

The 21st Century is now upon us with a multitude of exciting possibilities and new challenges. PICO ENERGY is no stranger to challenges as it always welcomed them as a prerequisite of progress. In the past, we had the burden of limited opportunities but the luxury of limited information. Today in a border-less world with the flow of information exceeding human capacity, we are faced with a different challenge; we have the burden of unlimited information but the luxury of unlimited opportunities. We are forced to filter, focus, select, and then prioritize more than any time before. Therefore, we believe that investing in human resources is fundamental for securing the flow of innovative ideas and the future potential of our organizations.

Our key corporate focus is now shifting from the traditional financial indicators towards building a sustainable intellectual base, adaptive to the rapid changing world around us. Our present drive for expansion and innovation is intended to propel us - forward as a major regional player in the Energy sector.

Eng. Salah Diab

PICO ENERGY Advanced Technological Solution Technologies LLC

PICO Technologies is a research, development and manufacturing company focused on innovative oil field equipment and tools. Currently dedicated to designing open-hole wireline logging tools and Production Optimization Control Systems, as well as Production development and management of several other projects. Our proprietary open-hole wire line logging technology provides high quality, cost effective triple combo tools with slimmer, shorter designs to enhance your operations. Full support and training ensure a high performance solution to your logging requirements.

For more information on how you can improve your fundamental logging operation, please contact us at: 19407 Park Row, #130 Houston, TX 77084

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Compensated Spectral Density Logging Tool

PICO's Compensated Spectral Density Logging (CSDL) tool provides state-of-the-art bulk density measurements to understand formation porosity and identify lithology.

Performance

The innovative, high quality tool has a short overall length of just 15.21 ft (4.63m) and a maximum outside diameter of only 4.5 in. (11.43cm). Its short length and smaller diameter contributes to a triple combo assembly that improves logging runs in short radius wellbores, and reduces rathole length to provide data across the full formation while cutting drilling requirements.

The tool is rugged and versatile. It operates in wellbore extremes up to 350°F (175°C) and maximum pressure of 20,000 psi. The minimum casing/tubing ID is 5 in. (12.7cm).

Technology summary

The CSDL uses a Cesium 137 gamma source to emit gamma rays into the formation. Some of the gamma ray energy is absorbed by the formation. Returning gamma rays are measured for analysis using scintillation detection. Data accuracy is assured through compensation for the presence of natural thorium, uranium and potassium sources using a photoelectric cross section.

Compensated Neutron Tool

The PICO Compensated Neutron Tool (PCNT) provides state-of-the-art measurement of formation porosity. The data is used with resistivity logs and/or pulsed neutron logs to determine formation water saturation. Combined with density logs from Pico's Spectral Density Logging Tool, the PCNT logs also indicate formation gas saturation and formation lithology.

Performance

The innovative, high quality tool has a short overall length of just 7.04 ft (2.14m) and a maximum outside diameter of only 3.625 in. (9.2cm). Its short length and smaller diameter contributes to a triple combo assembly that improves logging runs in short radius wellbores, and reduces rathole length to provide data across the full formation while cutting drilling requirements.

The tool is rugged and versatile. It operates in wellbore extremes up to 350°F (175°C) and maximum pressure of 20,000 psi. The minimum casing/tubing ID is 4 in. (10.16cm).

Technology summary

Based on neutron-nuclei interactions, the PCNT emits neutrons into the formation using a 15 Curie AmBi 241 source. Slowed by hydrogen nuclei in the formation, the returning neutrons are detected by a Helium3 gas detector. Hydrogen presence is measured to determine formation porosity.

Specifications: Compensated Spectral Density Logging Tool



- Length: 15.21 ft (4.63m)
- Max OD: 4.5 in. (11.43 cm)
- Min Hole: 5 in. (12.7 cm)
- Max Hole: 22 in. (55.9 cm)
- Max Temp: 350°F (175°C)
- Max Press: 20,000 psi
- Pad Length: 43 in.
- Pad Width: 3.28 in.
- Weight: 428 lb

Specifications: Compensated Neutron Tool



- Length: 7.04 ft (2.14m)
- Max OD: 3.625 in. (9.2 cm)
- Min Hole: 4 in. (10.16 cm)
- Max Hole: 20.75 in. (52.7 cm)
- Max Temp: 350°F (175°C)
- Max Press: 20,000 psi
- Weight: 144 lb

Applications include:

- Determination of formation bulk density and porosity
- Identify formation lithology regardless of formation fluid type
- Delineate thinly bedded formations
- Gas detection when used in combination with a neutron log

Features include:

- Highly accurate measurements of ± 0.01 gm/cc, no standoff
- Logging in a full range of borehole fluids, including salt and freshwater, oil and air, at speeds as high as 60 ft/min.
- A decentralizer presses the source and detector pad against the wellbore wall to ensure high quality formation data.
- Wellbore environments up to 350°F and 20,000 psi

Borehole conditions

- Environment: salt, fresh, oil and air
- Maximum logging speed: 60 ft/min
- Tool positioning: Eccentralized

Hardware characteristics

Source Type:	1.5 Ci Cesium-137
Sensor Type:	NaI Scintillation
Sensor Spacing:	Proprietary
Sample Rate:	4 or 10 samples/ft
No. Channels:	128
Full Spectrum:	Full
Combinability:	PTEL

Applications include:

- Determination of porosity
- Determination of lithology
- Detection of formation gas

Features include:

- Highly accurate measurements of $\pm 5\%$ or 1 p.u. (whichever is greater)
- A bowspring decentralizer presses the tool against the wellbore wall to ensure acquisition of high quality formation data
- Wellbore environments up to 350°F and 20,000 psi

Borehole conditions

- Environment: salt, fresh, oil and air
- Recommended logging speed: 60 ft/min
- Tool positioning: Eccentralized

Hardware characteristics

Source Type:	15Curie AmBi241
Sensor Type:	Helium3 Gas Detector
Sensor Spacing:	Proprietary
Sample Rate:	4 or 10 samples/ft
No. Windows:	Aggregate Counts
Full Spectrum:	Aggregate Counts
Combinability:	PTEL below PSGT, above TBI

Calibration

- Primary: UT Test Pit
- Secondary: Water Tank
- Wellsite Verifier: Ice Block

Thin Bed Array Induction Tool

The PICO Thin Bed Array Induction (PTBI) tool measures formation resistivity in fresh water environments using electromagnetic induction. In addition to standard horizontal measurements, vertical conductivity measurement (relative to the axis of the tool) enables examination of thinly bedded and dipping reservoir rock.

Performance

The innovative, high quality tool has a short overall length of just 19.6 ft (5.97m) and a maximum outside diameter of only 3.625 in. (9.2cm). Its short length and smaller diameter contributes to a triple combo assembly that improves logging runs in short radius wellbores, and reduces rathole length to provide data across the full formation while cutting drilling requirements.

The tool is rugged and versatile. It operates in wellbore extremes up to 350°F (175°C) and maximum pressure of 20,000 psi. The minimum casing/tubing ID is 4 in. (10.16cm).

Technology summary

Resistivity of rock and fluids around the wellbore is proportional—when pores are partially filled with gas or oil, the formation resistance to an electric current is higher; when the pores are filled with water resistance is lower. The differences in the logged resistivity of the formation are used to calculate hydrocarbon saturation and determine the reservoir's reserve potential.

Specifications: Thin Bed Array Induction Tool



- Length: 19.6 ft (5.97 m)
- Max OD: 3.625 in. (9.2 cm)
- Max Temp: 350° F (175°C)
- Max Press: 20,000 psi
- Max OD: 3.625 in. (9.2 cm)
- Min Hole: 4 in. (10.16 cm)
- Max Hole: 24 in. (61 cm)
- Weight: 299 lb

Applications include:

- Determination of porosity when combined with neutron or density logs
- Reserves estimation

Features include:

- Vertical resolution of 1, 2, and 4 ft
- A depth of investigation from 10 to 90 in
- A 16, 24, and 32 KHz coil array
- Logging in a full range of borehole fluids, including salt and freshwater, oil and air, at speeds as high as 100 ft/min.

Borehole conditions

- Environment: salt, fresh, oil and air
- Recommended logging speed: 100 ft/min
- Tool positioning: Centralized and eccentricized

Hardware characteristics

Source Type:	16, 24, 32 KHz Coil Arrays
Sensor Type:	Coil Array
Sensor Spacing:	Proprietary
Sample Rate:	4 samples/ft
No. Channels:	6
Combinability:	Bottom only

Calibration

- Primary: Precision conductive loop
- Secondary: Internal R and X Cal signals
- Wellsite Verifier: Precision resistor, sonde error offset

Telemetry Natural Gamma Tool

The PICO Telemetry Natural Gamma (PTNG) tool measures naturally occurring radiation in the formation. The data is used to understand rock types to identify production potential, estimate shale volume, and correlate lithology.

The PICO Telemetry (PTEL) system integrated on top of the PTNG enables depth correction using a single tool by providing reliable, high bandwidth communication between down hole and surface systems.

Performance

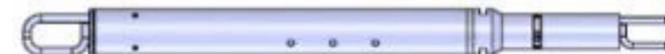
The innovative, high quality tool has a short overall length of just 4.2 ft (1.28m) and a maximum outside diameter of only 3.625 in. (9.2cm). Its short length and smaller diameter contributes to a triple combo assembly that improves logging runs in short radius wellbores, and reduces rathole length to provide data across the full formation while cutting drilling requirements.

The tool is rugged and versatile. It operates in wellbore extremes up to 350°F (175°C) and maximum pressure of 20,000 psi. The minimum casing/tubing ID is 4 in. (10.16cm).

Technology summary

Rock types including sandstone, limestone, anhydrite and halite have low radiation levels, while shales, claystones have higher radiation levels. As a result, low gamma measurements are used to identify potential hydrocarbon bearing rock while higher values indicate shale volume. Variations in measurements correspond to changes in lithology, which enables formation correlation in different wells and the correlation of multiple log runs in the same well. Gamma ray logs also measure emissions from radioactive materials in water or from water-related deposits, allowing detection of water migration through the formation.

Specifications: Telemetry Natural Gamma Tool



- Length: 4.2 ft (1.28 m)
- Max OD: 3.625 in. (9.2 cm)
- Min Hole: 4 in. (10.16 cm)
- Max Hole: 24 in. (60.96)
- Max Temp: 350°F (175°C)
- Max Press: 20,000 psi
- Weight: 68 lb

Hardware characteristics

Sensor Type:	Nal
Sample Rate:	4 or 10 samples/ft

Measurement

- Principle: gamma ray aggregate
- Range: 3 MeV
- Vertical Resolution (90%): 18 – 36 in. (standard)
- Depth of Investigation (50%); 4 in. (90%: 11 in.)
- Precision (ISD)
- At 60 ft/min $\pm 7\%$ or ± 5 API, whichever is greater
- At 30 ft/min $\pm 5\%$ or ± 5 API, whichever is greater
- Primary Curves: GR
- Secondary Curves: none

Calibration

- Primary: API gamma ray, Univ. of Houston
- Secondary: Thorium verifier
- Wellsite Verifier: Thorium verifier

Applications include:

- Indication of hydrocarbon bearing zones
- Estimation of shale volume
- Correlation of formations in different wells
- Correlation of log run depths in the same well
- Delineation of bed boundaries
- Detection of water migration

Features include:

- Highly precise measurements:
 - $\pm 7\%$ or ± 5 API (whichever is greater) at 60 ft/min
 - $\pm 5\%$ or ± 5 API (whichever is greater) at 30 ft/min
- Logging in a full range of borehole fluids, including salt and freshwater, oil and air, at speeds as high as 60 ft/min.

Borehole conditions

- Environment: Salt, fresh, oil, and air
- Recommended Maximum Logging Speed: 60 ft/min
- Tool Positioning: Centralized and eccentricized



Telemetry Spectral Gamma Tool

The PICO Telemetry Natural Gamma (PTNG) tool measures naturally occurring radiation in the formation. The data is used to understand rock types to identify production potential, estimate shale volume, and correlate lithology.

The PICO Telemetry (PTEL) system integrated on top of the PTSG enables depth correction using a single tool by providing reliable, high bandwidth communication between down hole and surface systems.

Performance

The innovative, high quality tool has a short overall length of just 5.08 ft (.61m) and a maximum outside diameter of only 3.625 in. (9.2cm). Its short length and smaller diameter contributes to a triple combo assembly that improves logging runs in short radius wellbores, and reduces rathole length to provide data across the full formation while cutting drilling requirements.

The tool is rugged and versatile. It operates in wellbore extremes up to 350°F (175°C) and maximum pressure of 20,000 psi. The minimum casing/tubing ID is 4 in. (10.16 cm).

Technology summary

Gamma ray spectral logging detects the three primary gamma ray contributors—potassium, thorium, and uranium and differentiates between them based on their different energy levels. This data improves log analysis in many ways. For example, the presence of thorium is a shale indicator. Because sandstones generally have low potassium and thorium concentrations compared to shale, spectral gamma logs help distinguish potential reservoir rocks. Fractured or highly permeable reservoirs can be indicated when high uranium concentrations appear with low potassium and thorium concentrations. The thorium-potassium ratio and other combined curves help identify minerals identification and support clay typing. By subtracting the uranium count from the total count, a uranium-corrected gamma ray curve can be produced to make it easier to correlate data between wells.

Specifications: Telemetry Spectral Gamma Tool



- Length: 5.08 ft (.61m)
- Max OD: 3.625 in. (9.2 cm)
- Max Temp: 350°F (175°C)
- Max Press: 20,000 psi
- Min Csg/Tbg ID: 4 in. (10.16 cm)
- Max Csg/Tbg OD: 20 in. (50.8)
- Weight: 89 lb

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Applications include:

- Shale indication in unconventional reservoirs
- Detection of potential production sources by indicating various reservoir rock types
- Identification of fractured or highly permeable reservoirs

Features include:

- Highly accurate measurements of $\pm 5\%$ API
- Logging in a full range of borehole fluids, including salt and freshwater, oil and air, at speeds as high as 60 ft/min.

Borehole conditions

- Environment: salt, fresh, oil and air
- Recommended logging speed: 60 ft/min
- Tool positioning: Centralized and eccentricized

Hardware characteristics

Sensor Type:	Nal
Sample Rate:	4 or 10 samples/ft
No. Channels:	256
Full Spectrum:	0 to 3 MeV

Measurement

- Principle: Gamma ray spectroscopy
- Range: 3 MeV
- Vertical Resolution (90%): 18 – 36 in. (standard); 18 in. (enhanced)
- Depth of Investigation (50%): 4 in. (90%: 11 in.)
- Precision (1SD): $\pm 5\%$ or ± 5 API, whichever is greater
- Accuracy: $\pm 5\%$ API
- Primary Curves: NGR, Uranium, Thorium, and Potassium concentrations
- Secondary Curves: Fit Error, Stabilizer, Counts

Calibration

- Primary: API gamma ray pit, K, U, Th, Univ. of Houston
- Secondary: Thorium verifier
- Wellsite Verifier: Thorium verifier



*Borehole Compensated Sonic Tool

PICO's Borehole Compensated Sonic Logging Tool measures formation shear wave velocity, and P, S and Stoneley wave amplitudes to support understanding of the lithological properties of the formation.

Performance

High quality data is acquired with two 20 KHz piezoelectric transmitters at a bandwidth of 7KHz to 32KHz. Tool length of just 15.9 ft (4.85m) and a maximum outside diameter only 3.375 in. (8.6cm) enhance logging runs in short radius wellbores and reduces rathole length.

Technology summary

Formation data acquired with the state-of-the art PFWS tool is used in many geological, geophysical, petrophysical and engineering applications, including reservoir evaluation, selecting well locations, and completion design.

**Under Development*

Specifications: Borehole Compensated Sonic Tool



- Length: 15.9 ft (4.85m)
- Max OD: 3.375 in. (8.6cm)
- Min Csg/Tbg ID: 3.75 in. (9.52 cm)
- Max Csg/Tbg OD: TBD
- Max Temp: 350°F (175°C)
- Max Press: 15,000psi
- Weight: 180 lb

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Applications include:

- Investigating formation lithology
- Identifying gas intervals
- Determining formation fluid content
- Detection of fractures
- Estimation of relative formation permeability

Features include:

- Dipole measurements
- Two receivers for multiple processing methods
- Measurements in saltwater, freshwater, and oil

Borehole conditions

- Borehole Fluids: Salt, Fresh, Oil
- Recommended Logging Speed: 60 ft/min
- Tool Positioning: Centralized

Hardware characteristics

Source Type:	Two 20 KHz Piezoelectric Transmitter
Sensor Type:	Two Piezoelectric Receivers
Sensor Spacings:	3, 5 feet
Firing Rate:	5 per sec
Sample rate:	10 per sec
Meas. Bandwidth:	7KHz to 32KHz
Sample Rate:	4 or 10 samples/ft

Measurement

- Principle: Full Waveform Sonic Travel Time
- Range: 40 to 190us/ft
- Vertical Resolution: 1.97ft
- Depth of Investigation: 0.98-1.48ft
- Accuracy: ± 1 us/ft
- Primary Curves: Waveform, Delta T
- Secondary Curves: Delta T for shear wave, Poisson's Ratio, quality curves

Calibration

- Primary: Internal CLK
- Secondary: Sonde Simulator
- Wellsite Verifier: Half pipe for 57us slowness check

*Advanced Borehole Imager Tool

PICO's Advanced Borehole Imager Tool provides state-of-the-art formation borehole imaging in water-based environments.

Performance

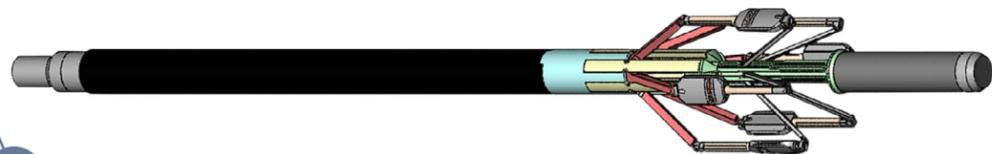
The ABIT is a state-of-the-art wireline logging tool with proprietary spacing of source and sensor button electrodes to ensure high-resolution imaging. Its short length and smaller diameter contributes to a triple combo assembly that improves logging runs in short radius wellbores, and reduces rathole length to provide data across the full formation while cutting drilling requirements

Technology summary

The ABIT technology introduces current to the formation and measures it using button electrodes. The tool reveals changes in micro resistivity resulting from the presence of conductive lithology and pore geometry.

*Under Development

Specifications: Advanced Borehole Imager Tool



- Max Temp: 350°F (177°C)
- Max OD: 5 in. (12.7cm)
- Length*: 24 ft (7.315m)
- Max Press: 20,000psi
- Min Hole: 6 in. (15.24 cm)
- Max Hole: 21 in. (53.34 cm)
- Weight: 496 lb (225 kg)

Hardware characteristics

Source Type: Button Electrodes
 Sensor Type: Button Electrodes
 Sensor Spacing: Proprietary
 Sample rate: 120 samples/ft
 Vertical Sampling: 0.1in

Measurement

- Principle: Laterolog
- Vertical Resolution: 0.2in
- Depth of Investigation: 30in
- Mud Resistivity Range: 0.01 ohm-10 ohm
- Coverage: 57% in 8.5 inch borehole

Calibration

- Primary: Precision conductive loop
- Secondary: Internal R and X Cal signals
- Wellsite Verifier: Precision resistor, sonde error offset

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*Pulsed Neutron Reservoir Saturation Tool

PICO's Pulsed Neutron Reservoir Saturation provides formation evaluation data in open hole/cased hole to distinguish between water and hydrocarbons to help determine porosity and bulk water in the formation.

Performance

The PNRST is a full 14 MeV pulsed neutron generator featuring three high Z fast decay detectors with 256 channels each for fast, high data acquisition. Its short length and smaller diameter contributes to a triple combo assembly that improves logging runs in short radius wellbores, and reduces rathole length to provide data across the full formation while cutting drilling requirements.

Technology summary

The pulsed neutron tool introduces bursts of neutrons into the formation. Energy resulting primarily from collisions with hydrogen atoms in water and hydrocarbons in pore spaces results in a thermalized state in which the neutron is captured by chlorine in the water to indicate water saturation.

*Under Development

Specifications: Pulsed Neutron Reservoir Saturation



- Max Temp: 325°F (167°C)
- Max OD: 2.125 in. (5.4cm)
- Length*: 8 ft (7.315m)
- Max Press: 15,000psi
- Min Hole: 3 in. (7.6 cm)
- Max Hole: 16 in. (40.6 cm)
- Weight: 75 lb (34 kg)

* In cased holes, Min, Csg/Tbg ID 2.375 in., Max Csg/Tbg ID is 16 in.

Applications include:

- Determining oil saturation
- Well integrity
- Zonal isolation
- Evaluate gravel packs
- Evaluating aging well
- Monitoring reservoir performance

Features include:

- Highly accurate measurements in cased hole
- Fast 15 ft/min logging rate
- Logging performance in short radius wellbores

Borehole conditions

- Borehole Fluids: Salt, Fresh, Oil, Air
- Recommended Logging Speed: 15 ft/min
- Tool Positioning: Eccentralized

Hardware characteristics

Source Type: 14 MeV Pulsed Neutron Generator
 Sensor Type: 3 detectors, High Z fast decay
 Sensor Spacing: Proprietary
 Sample rate: 4 samples/foot
 No. Windows: 135 channels per detector
 Full Spectrum: 3 - 256 ch per detector
 Combinability: below PTeI, optional above TBI, below PCNT, PDST

Measurement

- Principle: Neutron decay and capture
- Range: -2 to 100 p.u.
- Vertical Resolution (90%): 1ft
- Depth of Investigation (50%): 4-7in
- Accuracy: ±5% SIGFORM, or ±1 capture unit whichever is greater
- Primary Curves: SigmaNear, SigmaFar, SigmaXFar
- Secondary Curves: Density, Porosity, Ratios, Quality Curves
- Computed Curves: Density, Porosity, Water Saturation, Oil Saturation, Gas Saturation, SigmaIntrinsic

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Further Specifications

a Compensated Spectral Density Logging Tool

Measurement			
	Bulk Density	P_n	P_n (High-Res)
Principle	Gamma attenuation		
Range	1.0 to 3.1 gm/cc	0 to 5	0 to 5
Vertical Resolution (90%)	33in. (standard) 5.5in. (enhanced)	4in.	2in.
Depth of Investigation (50%)	1.5in.	0.5in.	0.5in.
Precision (1SD) at 2.70 g/cc	(Bulk Density)	(P_n)	P_n (High-Res)
at 60ft/min	± 0.015 g/cc	± 0.07	± 0.15
at 30ft/min	± 0.01 g/cc	± 0.05	± 0.10
Accuracy	± 0.01 gm/cc, no standoff		
Physical Strengths*			
Hardware	Tension	Compression	Torque
Tool Joints	130,000 lb (59,000 Kg)	130,000 lb (59,000 Kg)	600 ft-lbs (850 n-m)
Other	75,000 lb (34,020 Kg)	75,000 lb (34,020 Kg)	na
* Strengths apply to new tools at 70°F (21°C) and 0 psi.			
Measure Points			
Measurement	Measure Point (Referenced from bottom of tool)		
Density	3.02 ft (0.92 m)		
Caliper (min)	3.22 ft (0.98 m)		
Caliper (max)	3.59 ft (1.09 m)		

b Compensated Neutron Tool

Measurement	
Principle	Neutron- Thermal Neutron
Range	-2 to 100 p.u.
Vertical Resolution (90%)	36 in. (standard), 20 in. (enhanced)
Depth of Investigation (50%)	6 in.
Precision (1SD)	Low Porosity (3 p.u.) at 60 ft/min ± 0.15 p.u. at 30 ft/min ± 0.1 p.u.
	Medium Porosity (30 p.u.) at 60 ft/min ± 0.4 p.u. at 30 ft/min ± 0.3 p.u.
	High Porosity (60 p.u.) at 60 ft/min ± 3.3 p.u. at 30 ft/min ± 2.3 p.u.
Accuracy	$\pm 5\%$ or ± 1 p.u., whichever is greater
Primary Curves	Neutron Porosity, Near-to-Far Detector Count Rate Ratio
Secondary Curves	Near-to-Far Detector Count Rates
Physical Strengths*	
Hardware	Tension
Tool Joints	130,000 lb (59,000 Kg)
Other	75,000 lb (34,020 Kg)
	Compression
	130,000 lb (59,000 Kg)
	75,000 lb (34,020 Kg)
	Torque
	600 ft-lbs (850 n-m)
	na
* Strengths apply to new tools at 70°F (21°C) and 0 psi.	

c Thin Bed Array Induction Tool

Physical Strengths*			
Hardware	Tension	Compression	Torque
Tool Joints	130,000 lb (59,000 Kg)	130,000 lb (59,000 Kg)	600 ft-lbs (850 n-m)
Other	75,000 lb (34,020 Kg)	75,000 lb (34,020 Kg)	na
* Strengths apply to new tools at 70°F (21°C) and 0 psi.			

d Telemetry Natural Gamma Tool

Physical Strengths*			
Hardware	Tension	Compression	Torque
Tool Joints	130,000 lb (59,000 Kg)	130,000 lb (59,000 Kg)	600 ft-lbs (850 n-m)
Other	75,000 lb (34,020 Kg)	75,000 lb (34,020 Kg)	na
* Strengths apply to new tools at 70°F (21°C) and 0 psi.			

e Telemetry Spectral Gamma Tool

Physical Strengths*			
Hardware	Tension	Compression	Torque
Tool Joints	130,000 lb (59,000 Kg)	130,000 lb (59,000 Kg)	600 ft-lbs (850 n-m)
Other	75,000 lb (34,020 Kg)	75,000 lb (34,020 Kg)	na
* Strengths apply to new tools at 70°F (21°C) and 0 psi.			

f Borehole Compensated Sonic Tool

Physical Strengths*			
Hardware	Tension	Compression	Torque
Tool Joints	35,000 lbs	23,000 lb	na
Other	na	na	na
* Strengths apply to new tools at 70°F (21°C) and 0 psi.			

g Advanced Borehole Imager Tool

Physical Strengths*			
Hardware	Tension	Compression	Torque
Tool Joints	130,000 lb	130,000 lb	600 ft-lbs
Other	130,000 lb	130,000 lb	600 ft-lbs
* Strengths apply to new tools at 70°F (21°C) and 0 psi.			

h Pulsed Neutron Reservoir Saturation Tool

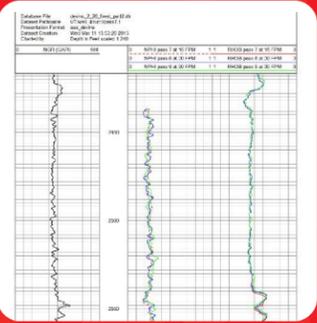
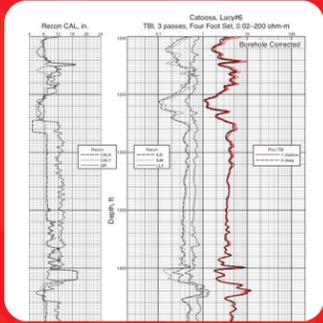
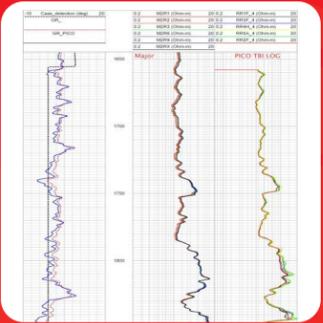
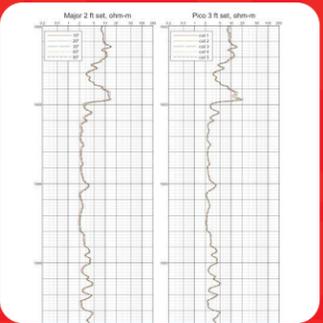
Physical Strengths*			
Hardware	Tension	Compression	Torque
Tool Joints	80,000 lb (36,300 Kg)	80,000 lb (36,300 Kg)	400 ft-lbs (567 n-m)
Other	75,000 lb (34,020 Kg)	75,000 lb (34,020 Kg)	na
* Strengths apply to new tools at 70°F (21°C) and 0 psi.			

*Under Development

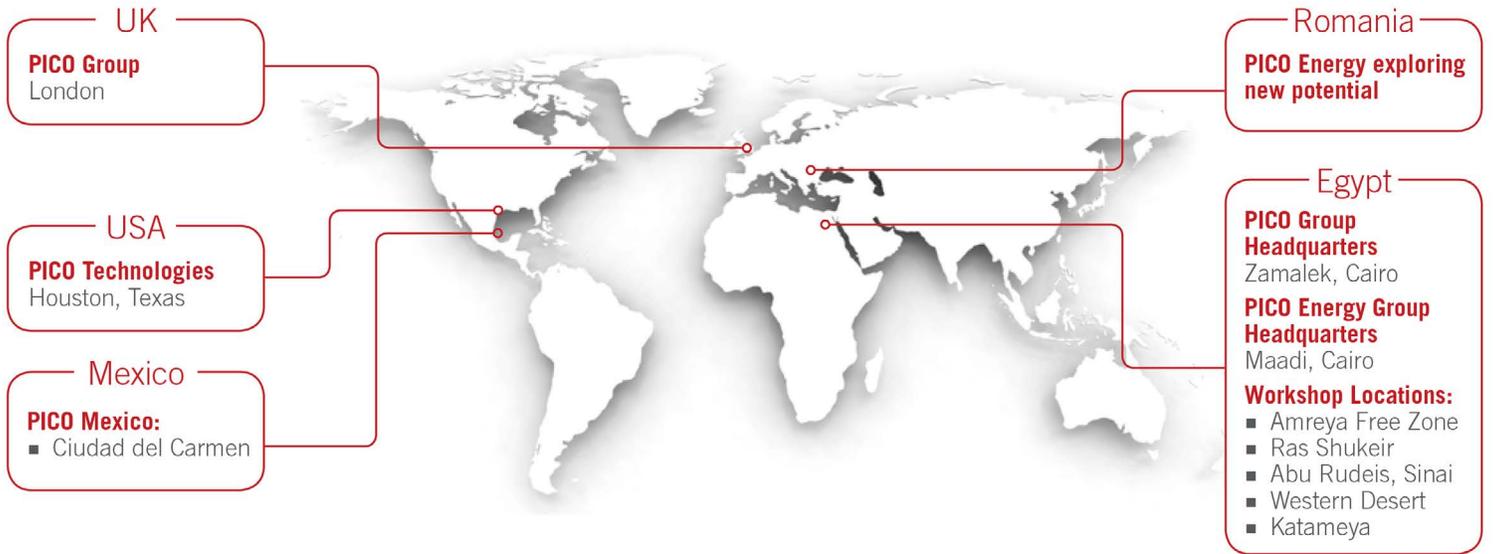




Field Testing Program



Our commitment to Research & Development of World Class Patent Technology requires us to maintain an ongoing Field Testing Program. Thorough testing proves the quality and reliability of our technology and tools. This process pushes us to strive for new innovations that will allow us to reach even higher standards for our clients.



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