Core Laboratories

Innovative Technology: Impacting Energy Industry Returns



2017 ANNUAL REPORT

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Core Laboratories is *The Reservoir Optimization Company*™

Core Laboratories is a leading provider of proprietary and patented reservoir description and production enhancement services and products. These services and products enable the Company's clients to optimize reservoir performance and maximize hydrocarbon recovery from their producing fields. The Company has over 70 offices in more than 50 countries and is located in every major oil-producing province in the world. Core Laboratories provides its services to the world's major, national, and independent oil companies.

Global Presence. Global Impact.



Advanced Technology Centers 🛧

Aberdeen - Abu Dhabi - Calgary - Houston - Kuala Lumpur - Rotterdam

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Investor Update

Throughout 2017, the activity level of the oil and gas industry in North America improved and Core Lab benefited from the resurgence of U.S. onshore activity. Additionally, preliminary signs of an international and offshore market recovery were beginning to appear with Final Investment Decisions ("FIDs") on several offshore developments being announced during the year. Core Laboratories' worldwide operations continued to focus on positioning our business to thrive in both the North America recovery and the initial stages of international activity recovery by delivering reservoir optimization innovations to help our oil company clients earn higher returns on their investments.

The oil and gas industry recovery, beginning with the U.S. onshore activity, is owed to the improvement in global crude oil economic fundamentals. Global energy consumption increased during the year, however, trends in crude oil production and crude oil inventories indicate that the market was under-supplied.



In addition, with the January 2017 OPEC cuts of approximately 1.3 million barrels of oil per day, plus cuts from cooperating non-OPEC producers, including Russia, the world market could now be under-supplied by more than 2 million barrels per day. The continued undersupply of crude oil led to extended worldwide inventory declines (now reaching over 20 months), which drove a rally in energy prices in late 2017. Further declines in inventory are likely, given the low rate of oil discoveries and the long lead times between investment and new oil and gas supply.

These fundamentals drove the tightening of crude oil supply and higher crude prices, and consequently, led U.S. onshore activity levels to improve as measured by the number of wells drilled and the number of wells completed. The production decline curve once again followed the irrefutable laws of physics and thermodynamics and led crude oil markets to sustain the re-balancing, which began mid-year 2016. Moreover, our sequential quarterly financial performance improved throughout 2017 owing to U.S. onshore well completions and international producing field activity. The producing field projects have focused on reservoir fluid phase-behavior aimed at reducing crude-oil decline rates from the existing worldwide base average of approximately 82 million barrels of crude oil production per day ("BOPD"). Though the international and offshore activity in crude oil regions remained flat to down throughout 2017, Core Lab outperformed falling international and deepwater drilling activity levels. The outperformance was underpinned by Core Lab's differentiated technology offerings, coupled with industry-leading reservoir fluid characterization capabilities -- particularly enhanced oil recovery ("EOR") in tight-oil unconventional reservoirs.

Investor Update - 2017

Since the beginning of the industry's downturn in November 2014, Core Lab's Free Cash Flow ("FCF") conversion ratio has outperformed the other 14 members of the Philadelphia Stock Exchange Oil Service Sector Index ("OSX"), including Schlumberger, Halliburton, National Oilwell Varco, and Oceaneering. The Company used its FCF to maximize Total Shareholder Return ("TSR") through regular dividend payments and our share buyback program. As a positive and differentiating factor among the OSX members, since implementing Core Lab's dividend program in 2008, Core Lab has rewarded its shareholders with returns through two industry downturn cycles. Since the inception of our Capital Return Program in 2002, Core Lab has returned approximately \$2.5 billion to our shareholders.





Figure 3 - Core Lab executive management and board members banging the opening gong at the Euronext Amsterdam Stock Exchange

In addition to celebrating our 22nd year as a publicly traded company and the 19th anniversary of our listing on the NYSE in 2017, Core Lab celebrated the fifth anniversary of our dual listing on the Euronext Amsterdam Stock Exchange in 2017. *Figure 3 shows the Core Lab executive management and board members on May 18,* 2017, banging the opening gong at the Euronext Amsterdam Stock Exchange, a tradition dating back centuries for the oldest stock market in the world. Core Lab's European investor-based ownership percentage remains the highest for any primary NYSE-listed maior oilfield service company.

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Investor Update - 2017

Core Lab's industry-leading share performance since our IPO (Table 1) is the result of our strict adherence to the following three financial tenets.

Maximize Free Cash Flow Through Fiscal Discipline

Core Lab follows a strict discipline for allocating capital for investment in growing our business, which is focused on generating high returns and positive FCF. The quality of a company's earnings is typically supported with cash flow from operations, and value is created with the ability to generate cash flow in excess of what is required for capital investments to maintain and grow their FCF.

We believe measuring the ratio of FCF generated from revenue is an important metric for shareholders when comparing companies' financial results, particularly for those shareholders who utilize discounted cash flow models to assess valuations.

This capital discipline produced a Revenue to Free Cash Flow Conversion Ratio of over 16% during 2017 placing Core Lab in the top of our peer group (Table 2). Core Lab also maintained a higher conversion ratio than any company in its peer group throughout the two industry downturns that began in 2008 - 2009 and starting in 2014. Further, as shown in Table 3, Core Lab's FCF has exceeded Net Income in 12 of the last 16 years. Core Lab will continue to demonstrate strict fiscal discipline in 2018 and beyond.

| TABLE 1 Annualized Total Shareholder Return, % | | | |
|--|----------|----------|---------------|
| Company | 10 Years | 15 Years | Since CLB IPO |
| Core Laboratories | 7.4% | 24.5% | 18.2% |
| Fugro | -13.2% | 6.5% | 11.0% |
| Oceaneering International | -3.7% | 9.3% | 9.9% |
| Halliburton | 3.0% | 12.2% | 8.6% |
| Schlumberger | -1.0% | 10.0% | 8.5% |
| Superior Energy Services | -13.6% | 0.7% | 6.0% |
| Baker Hughes | -3.9% | 3.3% | 4.3% |
| Nabors Industries | -13.1% | -6.1% | 2.2% |
| Weatherford International | -22.8% | -8.3% | 1.5% |
| TechnipFMC | 0.7% | 13.2% | N/A |
| John Wood Group | 2.0% | 10.2% | N/A |
| Oil States International | 0.1% | 9.3% | N/A |
| Helix Energy Solutions | -15.7% | -2.5% | N/A |
| CARBO Ceramics | -13.8% | -6.2% | N/A |
| ourse: Ploambarg 12 months trailing as reported through E March 2019 | | | |

Source: Bloomberg, 12 months trailing as reported through 5 March 2018

| TABLE 2 - Revenue to Free Cash Flow Conversion Ratio, % | | |
|--|--------|--|
| Company Since CLB IPO | | |
| Core Laboratories | 16.0% | |
| Oil States International | 9.0% | |
| Schlumberger | 0.0% | |
| Halliburton | 5.3% | |
| John Wood Group | 3.4% | |
| Oceaneering International | 2.2% | |
| RPC | 1.0% | |
| Frank's International | 0.6% | |
| Average | -0.2% | |
| TechnipFMC | -0.3% | |
| Superior Energy Services | -3.3% | |
| Fugro | -4.6% | |
| Forum Energy Technologies | -8.2% | |
| Baker Hughes | -8.5% | |
| Weatherford International | -10.8% | |
| Nabors Industries | -20.0% | |
| CARBO Ceramics | -24.0% | |
| Helix Energy Solutions | -30.9% | |

Source: Bloomberg, 12 months trailing as reported through 5 March 2018

TABLE 3 - Annual Net Income vs. Free Cash Flow

| Year | Net Income | Free Cash FLow |
|------|-------------|----------------|
| 2017 | 83,000,000 | 105,000,000 |
| 2016 | 64,000,000 | 121,000,000 |
| 2015 | 115,000,000 | 196,000,000 |
| 2014 | 257,000,000 | 267,000,000 |
| 2013 | 243,000,000 | 263,000,000 |
| 2012 | 216,000,000 | 206,000,000 |
| 2011 | 185,000,000 | 174,000,000 |
| 2010 | 145,000,000 | 178,000,000 |
| 2009 | 114,000,000 | 165,000,000 |
| 2008 | 144,000,000 | 124,000,000 |
| 2007 | 121,000,000 | 102,000,000 |
| 2006 | 83,000,000 | 96,000,000 |
| 2005 | 31,000,000 | 56,000,000 |
| 2004 | 12,000,000 | 44,000,000 |
| 2003 | 9,000,000 | 41,000,000 |
| 2002 | (9,000,000) | 22,000,000 |

Maximize Return on Invested Capital

Core Lab's Board has maintained an incentive compensation program for the executive and senior management teams based on the Company achieving a leading relative ROIC performance compared with the oilfield service companies listed as Core Lab's Comp Group by Bloomberg Financial. Core Lab's Board believes that stock price performance over time is directly related to ROIC. Table 4 lists ROICs for major oilfield service companies as calculated by Bloomberg Financial. Core Lab has the highest ROIC of the major oilfield service companies and is the only company with a return above its Weighted Average Cost of Capital ("WACC").

| TABLE 4 - Return on Invested Capital, % | | | |
|---|----------------------------|-------|--------------------|
| Company | Return on Invested Capital | WACC | Returns Above WACC |
| Core Laboratories | 26.4% | 10.1% | 16.3% |
| Halliburton | 2.8% | 8.4% | -5.6% |
| TechnipFMC | 2.5% | 8.5% | -6.0% |
| Oceaneering International | -0.5% | 10.3% | -10.8% |
| Schlumberger | -2.1% | 8.8% | -10.9% |
| John Wood Group | -0.7% | 10.5% | -11.2% |
| Nabors Industries | -4.4% | 7.4% | -11.7% |
| Baker Hughes | -2.7% | 9.0% | -11.8% |
| Helix Energy Solutions | -1.2% | 10.9% | -12.0% |
| Fugro | -4.1% | 9.2% | -13.3% |
| Average | -4.3% | 9.9% | -14.2% |
| Forum Energy Technologies | -5.5% | 12.4% | -17.8% |
| Oil States International | -7.1% | 12.5% | -19.6% |
| Superior Energy Services | -10.6% | 9.5% | -20.1% |
| Frank's International | -20.4% | 13.2% | -33.6% |
| CARBO Ceramics | -28.7% | 10.3% | -39.0% |
| Weatherford International | -30.1% | 9.8% | -39.9% |

Source: Bloomberg and company filings, Return on Invested Capital and Weighted Average Cost of Capital reported through 5 March 2018



B Return Excess Capital to Shareholders

Since October 2002, Core Laboratories has returned excess capital to its shareholders in the form of reductions in diluted share count (Table 5) and through dividends. As indicated in Table 6, Core Lab has returned \$2.5 billion, or over \$56.12 per diluted share, to its shareholders.

The Company will continue to return excess capital to its shareholders via dividends, as well as through additional share repurchases.

| TABLE 6 - Capital Returned to Core Lab Shareholders | | |
|---|---------------|--|
| Total Capital Returned | \$2.5 billion | |
| Share Repurchases, Warrant Settlements | \$1.9 billion | |
| Quarterly Dividends | \$627 million | |
| Per Share Capital Return | \$56.12 | |

TABLE 5 - Annual Diluted Share Count

| Vear | Outstanding Share Count |
|------|-------------------------|
| 2017 | |
| 2017 | 44,275,735 |
| 2016 | 44,325,888 |
| 2015 | 42,517,685 |
| 2014 | 43,927,036 |
| 2013 | 45,516,702 |
| 2012 | 46,857,328 |
| 2011 | 47,676,588 |
| 2010 | 49,256,611 |
| 2009 | 47,353,640 |
| 2008 | 46,577,983 |
| 2007 | 49,059,559 |
| 2006 | 51,306,408 |
| 2005 | 56,088,454 |
| 2004 | 56,644,130 |
| 2003 | 59,018,048 |
| 2002 | 66,249,908 |
| 2001 | 67,851,938 |

Core Lab's Investor Relations Program

In 2017, *Institutional Investor* named Core Lab as having one of the three best Investor Relations Programs. Our efforts were recognized in a survey of both the buy-side and sell-side investment communities. We take pride in the results of our investor outreach efforts. Our 2017 Investor Relations team is pictured to the right, and this team is augmented by several of our employees located around the globe who lead our facility tours, attend conferences, and represent the Company on various technical panels and presentations throughout the year. Additionally, we would like to congratulate Richard L. Bergmark, Core Lab's Executive Vice President and Chief Financial Officer, for being named to the *Institutional Investor* 2018 All-American Best CFO (Oil Services and Equipment).



From left to right: David M. Demshur, Gwendolyn Y. Schreffler, Richard L. Bergmark

Message from the Executive Team

2017 – Emergence of an Industry Recovery and Positive Industry-changing Trends

uring 2017, the industry investment community focused on the financial return value proposition from publicly traded oil companies. Over the decades, Core Lab's clients have been, and are today, among those producing financial returns through the use of technologically advanced services and products to drive the most economical crude oil production growth over the life of their fields.

Consequently, as the industry begins to recover with U.S. onshore activity drilling over 20,000 wells during the year and well completion activity up 49% over 2016, Core Lab's 4,600 worldwide employees produced improved financial results, yielding industryleading return on invested capital and free cash flow. Our clients utilized Core Lab's newest technologies to maximize their daily production of crude oil and natural gas while optimizing their Incremental Recovery Rates ("IRR") and Estimated Ultimate Recovery ("EUR") of hydrocarbons from their producing fields (Figure 4). Core Lab's continued focus on its three long-term growth strategies, underpinned by operational excellence, enabled Core Lab's Production Enhancement segment to outpace U.S. onshore activity.

As part of the industry's recovery, oil companies have taken action to reinvest in developing crude oil discoveries. This reinvestment at a global level is critical in order to meet future supply needs. The oil companies' desire to reinvest is evidenced by their successful efforts to reduce and align capital development project costs with today's crude oil price per barrel. This has enabled oil companies to make FIDs on current projects, revamp previously announced FIDs and initiate new projects such as: ExxonMobil's Liza field offshore Guyana, Shell's Appomattox field in deepwater Gulf of Mexico ("GOM"), and Chevron's Tengiz field in Kazakhstan (Figure 5).



Back: Mark F. Elvig, Monty L. Davis, Richard L. Bergmark Center: David M. Demshur





Figure 5 - Example Oil Company Final Investment Decision Projects

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In North America, an energy recovery is underway, spearheaded by the emergence of technologies applied to unconventional reservoirs. These complex completions are driving the wells of the future and yielding higher potential returns from tight-oil reservoirs.

During 2017, Core Lab observed the emergence of four major industry trends that will shape tomorrow's oilfield and Core Lab's client activities for years to come. Core Lab is utilizing these trends to focus the Company's technology to enhance the growth and profitability of Core Lab and its clients.

The **first major trend** is enhanced oil recovery ("EOR") from tight oil reservoirs. Core Lab's early work in some tight-oil reservoirs has indicated possible increases in recoveries from an average of about 9% to perhaps 13% to 15% by utilizing engineered gas injection techniques, gas-induced diffusion, and proprietary reservoir condition laboratory instrumentation and testing protocols. Ongoing laboratory dynamic flow tests look promising.



Get a recovery greater than 9% in unconventional reservoirs



Also, we are currently investigating dense and complex completion and stimulation programs and their role in unconventional EOR project design. Proper preparation of the formation by maximizing the stimulated reservoir volume ("SRV") could be key to efficient EOR efforts. Increased recovery rates of as much as 50% can increase the clients' return on invested capital by improving reservoir type curves and creating a positive impact on the clients' free cash flow.

Message from the Executive Team - 2017

The **second major trend** is the interest in using finer proppants when executing the hydraulic frac program of ultra-complex wells that were drilled on a pad. Core Lab, via its industry-wide proppant consortia with a 30-plus-year history and consisting of over 40 companies, is boosting its evaluation of sub-100 mesh non-API sand.

These micro-proppants are thought to hold open secondary and tertiary fractures, significantly increasing SRV by an order of magnitude, therefore increasing the initial flow rates as well as the estimated ultimate recovery.

The **third major trend** is the continued increase in proppant loading, the number of perforation clusters per stage, and the number of stages per well. At the end of 2017, stage count had grown 34% for the year to an average of 40 stages per well, with an average separation of approximately 250-400 feet. Proppant placed per lateral foot increased by approximately 50% to 1,700 pounds during the year, with an average well now receiving 14 million pounds of proppant.

The growth in lateral length has been more muted, showing only a 14% increase, owing to limitations imposed by frictional forces. However, Core Lab is currently testing friction reduction additives designed to ensure that lateral lengths can still be extended.

Finally, the **fourth major trend** deals with the use of multi-variant data sets, neural networks related to machine learning, artificial intelligence, and data analytics to increase our clients' efficiency, reduce cost in evaluating their reservoirs, and increase the value of their reserves. Core Lab's long history of industry-leading database generation and management are well placed to leverage advancements in data analytics.





Message from the Executive Team - 2017

Consolidated Company Results

For 2017, Core Laboratories posted revenue and operating profit of \$659,800,000 and \$112,400,000, respectively. Operating margins remained at an oilfield industry high of 17%, several hundred basis points higher than those of other major oilfield service companies. Net income for 2017 was \$83,100,000 and earnings per diluted share were \$1.88.

Core Lab continues to focus on maximizing Free Cash Flow, the Company's first financial tenet, which resulted in the highest revenue to Free Cash Flow conversion ratio among comparable oil service companies. By selecting projects that generate high ROIC, Core Lab's second financial tenet, the Company has achieved the highest ROIC among all major oilfield service companies.

In keeping with Core Lab's third financial tenet, the Company continued to return excess capital to its shareholders in 2017 via regular dividends and share repurchases. The cumulative capital returned to shareholders as of December 31, 2017 was approximately \$2.5 billion, or approximately \$56.12 per diluted share.

Revenue (\$ in millions)



400

Operating Profit (\$ in millions)



Operating Margins (%)



Earnings per Diluted Shares (\$)



Net Income (\$ in millions)



Free Cash Flow (\$ in millions)







Bright Future

Core Laboratories' unique and primary focus on providing new technologies and services to help our clients produce incremental hydrocarbons from their producing fields has led to positively positioning the Company as the oil and gas industry's recovery continues to unfold. Core Lab remains the most technologically advanced reservoir optimization company in the oilfield universe.

As the long-term demand for hydrocarbons continues to grow, and the size and rate of new oilfield discoveries shrinks, Core Laboratories' position as the technology leader in optimizing hydrocarbon reservoir performance could not be more opportune. This is especially the case for recent oil and gas developments in both offshore and unconventional reservoirs where recovery results may be limited without employing complex completions.

We are proud to have accomplished the goal we set in 1994 of becoming the Best Oilfield Services Company. In the most recent Oilfield Services Suppliers Customer Satisfaction Rating & Analysis Report from EnergyPoint Research, Core Laboratories was rated:

- 1st in Total Satisfaction for all Oilfield Services
- 1st in Core & Fluids Analysis
- 1st in Formation & Well Evaluation
- 1st in Job Quality
- 1st in Technology

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The survey rankings are based upon more than 3,300 comprehensive evaluations by qualified respondents at domestic and global E&P companies and other upstream professionals and organizations.



Innovative Solutions | Integrity | Superior Service



Figure 6 - Unconventional EOR Technology - Engineered Gas Injection



Figure 7 - HERO $^{ extsf{B}}$ PerFRAC Perforating System



Figure 8 - FLOWPROFILER™ Diagnostics



2017 Result Drivers

The Well of the Future Is Here

In 2013, Core Lab's Annual Report theme was Energy Industry Renaissance: The Horizontal Well – the well of the future. The future is here thanks to the evolution of completion techniques and unconventional



EOR methods. Today's scientifically-driven operator is focused on the possibilities and limitations of tight-oil rock quality, decline curves and the laws of physics and thermodynamics. Core Lab's innovative technologies in the areas of EOR on unconventional reservoirs along with its proprietary *HERO[®] PerFRAC* perforating products and **FLOWPROFILER™** completion diagnostic systems are being used to optimize recovery from these challenging reservoirs as seen in Figures 6, 7, and 8 (On the inside flap).

What Has Led to Evolving Tight-oil **Recovery Techniques**

As with any crude oil reservoir, the quality of the reservoir rock is critical to the incremental and ultimate recovery rates over the life of the reservoir. On average, approximately 9% of the reserves are currently recovered from unconventional oil reservoirs. And, with some tight-oil reservoirs reaching peak production, the improvement and evolution of recovery techniques will be required to maintain and/or increase incremental and ultimate recovery rates. The scientific technology and shareholder return-focused operators have shifted their recovery approach to longer horizontal lateral well lengths, more stages, tighter clusters and more proppant in an effort to increase incremental production from their reservoirs. This is a reality today and is something Core Lab has assisted with for almost a decade.

2017 Result Drivers

What Matters and Why?

Quality of the reservoir rock and the completion techniques matter the most. Beginning with the shale revolution in the mid-2000's, Core Lab developed a powerful tool for evaluating and predicting production from oil shale reservoirs based upon seven-plus decades of worldwide geological scientific knowledge and multi-variant data sets. The foundation for this predictive tool lies within Core Lab's extensive and unmatched database of unconventional reservoir properties. Core Lab's Shale Reservoir Quality Index ("SRQI") is based on numerous petrophysical, geological, geomechanical, and geochemical parameters relating to actual hydrocarbon production. Figure 9 is an SRQI profile plot of acreage positions, wherein the acreage with the best reservoir quality and cumulative oil production per linear foot are located at the top right.

Figure 9 - Core's Shale Reservoir Quality Index ("SRQI")



Shale Reservoir Quality Index

Many oil shale reservoirs are naturally fractured by stresses within the rock formation and geologic basin. Core Lab's proprietary Dual Energy CT imaging tools provide a comprehensive description and evaluation of the natural fracture networks for each oil shale core to aid in future well placement, horizontal drilling plans, and design of stimulation programs. Together with the natural fracture system, the induced fractures created during the stimulation program are paramount to increasing SRV. The amount of SRV created during the stimulation program is critical to optimizing engineered gas injection techniques for unconventional EOR. In conventional reservoirs, EOR processes typically rely on physically driving or pushing oil from injector wells to producer wells. By comparison, in unconventional reservoirs, EOR efforts are more controlled by maximizing the surface area of the formation that can be contacted by the injected engineered gas.

Also important to increasing the SRV and preparing the well for unconventional EOR is the exploitation of the secondary and tertiary fracture networks of the reservoir. During the stimulation program, three fracture networks are created: primary, secondary and tertiary. The primary network is propped open with coarse mesh proppant during the hydraulic fracturing program; however, the secondary and tertiary fractures close shortly after the hydraulic fracing ends because large mesh sand cannot access these fine-scale fractures. By using finer mesh micro proppants in the 200- and 400mesh range, the SRV can be significantly expanded, thereby, increasing hydrocarbon flow rates and estimated ultimate recovery from tight-oil reservoirs.





What is Core Lab's Role?

Core Lab's Reservoir Description operation's primary focus is principally driven by operating budgets from global onshore and offshore existing fields. Core's clients are increasingly interested in unconventional EOR studies and technology development to improve tight-oil recovery methods.

In 2017, the Company continued to increase the number of major EOR projects in various stages of unconventional reservoir developments. The unconventional EOR projects included designing and utilizing innovative technologies specifically for tight-oil reservoirs. These projects cover a variety of formations and basins with multiple Core Lab clients. During the year, Core Lab received industry support to initiate a Joint Industry Project entitled "Unconventional EOR in the Eagle Ford Formation". This study, along with the proprietary lab-based studies, will determine the most effective techniques to boost ultimate recovery rates in the Eagle Ford and other targeted plays.

Core Lab has determined that EOR techniques effective in unconventional reservoirs will differ greatly from EOR methods applied in worldwide conventional reservoirs. Traditional EOR programs in conventional reservoirs are typically triggered late in the life of a field. Core Lab is working to assess when unconventional EOR programs might be best deployed, so as to maximize both early and ultimate recovery. Another area of investigation is the incremental oil returns from successive engineered gas injection cycles.



The Core Lab HP/HT PVT Cell can test with full visibility live reservoir fluids at 250 ml and 2000 bar



High Frequency - NMR Lab

2017 Result Drivers







Laboratory-based tests using engineered gas injection of light hydrocarbon gases and the adsorption and capture of longer-chain oil hydrocarbons in unconventional reservoirs demonstrate the potential for significant improvement in oil recovery factors above the current 9% expected rate. Core Lab's internally developed High Frequency Nuclear Magnetic Resonance ("NMR") devices, combined with its proprietary High-Pressure, High-Temperature ("HPHT") full visualization Pressure Volume Temperature ("PVT") lab capabilities are enabling these advancements (Figures 10 and 11).

Production Enhancement

Production Enhancement operations, largely focused on North American unconventional reservoirs and deepwater completions and stimulations, experienced significant improvement as U.S. onshore completion activity levels began to improve in the second half of 2016 and continued throughout 2017.

Core Lab's Production Enhancement engineering teams released the *HERO[®] PerFRAC* perforating system in response to client demand for energetics designed specifically to drive incremental production from their heterogeneous formations. The *HERO[®] PerFRAC* system is the industry's first perforating energetic that provides a consistent hole size throughout the perforating cluster, thereby maximizing frac efficiency and increasing SRV.





HERO[®] PerFRAC

The *HERO® PerFRAC* delivers optimal penetration with minimal debris and consistent hole-size around the wellbore for improved reservoir stimulation. Creation of consistent hole sizes with minimal debris throughout the perforating cluster equalizes the perforating friction and allows all perforations to contribute to the fracing operation. This provides three financial benefits to Core Lab's clients: (1) lower frac costs, (2) increased SRV, and (3) increased production.

This technology product is designed to reduce tortuosity, enhancing proppant deployment at lower hydraulic pumping pressures. The *HERO® PerFRAC* system is specifically designed to provide 100% contribution of perforations, require minimal hydraulic horsepower to efficiently place fracture treatments, maximize SRV, and increase ultimate recovery from the reservoir.

Micro-Proppant Evaluation

As part of the fracture treatment and to further support Core Lab's clients who are increasingly focused on enhancing their stimulation programs, the Company expanded its industry-wide consortia to evaluate the use of fine mesh proppants and nontraditional sand sources such as dune deposits to improve the effectiveness of hydraulic fracing programs.

Recent academic literature suggests the secondary and tertiary fractures that are initially opened but not propped are estimated to be 90% of the volume of the fracture network. By keeping those fractures propped open, micro-proppants pumped during the placement at the beginning of the frac could potentially boost type curves expected recovery by tens of thousands of barrels with very little added cost. Afterwards, pumping 100-, 70-, and 40-mesh sand late in the frac process also appears to be critical for success.

FLOWPROFILER[™]

The **FLOWPROFILER™** service injects unique diagnostic tracers into each frac stage. When the well flows, crude oil samples are collected and analyzed to identify and quantify flow from each stage as indicated by the quantitative return of each of these unique diagnostic tracers. Stages not flowing optimally can be identified, precipitating remedial efforts and providing valuable insights for future wells.

The combined knowledge of both the zonal water and oil profiles provide unique data sets to accurately understand the total after-frac flow profile for evaluating individual well production and making critical next well decisions.

FLOWPROFILER™ diagnostic tracers are also being used to identify communication among frac stages from the treatment well to surrounding offset wells and pads, enabling the operator to make informed decisions on lateral and vertical spacing as seen in Figure 12.

As Core Lab saw unconventional EOR technology gaining acceptance, a joint task force between Reservoir Description and Production Enhancement operations was constructed to bridge laboratory and field-scale tests. As clients look to upscale laboratory-validated gas cycling methods to field-level projects, Core Lab was requested to conduct diagnostic services as a way to, among other objectives, determine if the injection gases are being contained within the target stratigraphic horizon(s).

Core Lab also worked on field-scale programs in which multiple oil and gas phase diagnostic tracers were deployed within the injection gas while produced hydrocarbons in adjacent wellbores and stratigraphic horizons were tested for the presence of these tracers. From this diagnostic testing, Core Lab's clients are gaining insight into the reservoir volume being contacted by the injected engineered gases, as well as breakthrough times and inter-well communication paths. Optimizing these parameters is essential to increasing adsorption efficiency on the target formation and, ultimately, oil recovery factors.

Figure 12 - Horizontal Well Lateral and Vertical Spacing Diagnostics





Near-Term Growth Catalysts

Worldwide crude oil production averaged approximately 82 million barrels per day during 2017, down from 88 million barrels in 2012 (at the height of offshore investment by oil companies), with roughly 30% coming from offshore fields. Since 2014, oil companies have significantly reduced their investment in new discoveries and developments due to the poor economics of these capital intensive projects. In some cases, they placed previously announced projects on hold. The downturn has resulted in oil companies taking the opportunity to lower project costs in alignment with break-even oil prices. As a result of this evaluation, our industry is experiencing a rebirth of FID announcements by oil companies. As these projects initiate or resume, they will have a long-term positive impact on crude oil reserve replacement needed to fulfill future global demand.

With approximately 40% of Core Lab's revenues coming from offshore producing fields, the potential future revenue from these reinvestments will be a growth opportunity for the Company.

During 2017, Senegal, Mexico and Guyana had the largest discoveries offshore, while other areas, such as Alaska, had significant discoveries announced. In addition to these new discoveries, other projects previously announced but not developed have now been relaunched such as BP's Mad Dog II, Shell's Appomattox (both in deepwater GOM), and Statoil's Johan Sverdrup in the northern Norwegian North Sea to name a few.

These types of field projects require longer lead times to develop than typical conventional fields and the technology needed for field development to optimize ultimate recovery and gain the most incremental barrels will require Core Lab's expertise in advanced reservoir optimization technologies and services.

Board of Supervisory Directors



David M. Demshur, Chairman of the Board and Chief Executive Officer



Richard L. Bergmark, Director & Officer Executive Vice President and Chief Financial Officer



Martha Z. Carnes, Director Retired Partner, PricewaterhouseCoopers LLP



Charles L. Dunlap, Director Former Chief Executive Officer, Transmontaigne Partners



Lucia van Geuns, Director Strategic Advisor, Energy for the Hague Center for Strategic Studies



Margaret A. van Kempen, Director Managing Director, Van Kempen Associates



Jan Willem Sodderland, Director Former Chairman of the Board, MUFG Bank (Europe) N. V.



Michael Straughen, Director Retired Executive Director and Chief Executive of the Engineering Division John Wood Group PLC

Stephen D. Weinroth, Chairman Emeritus Managing Director, Hudson Capital Advisors, LLC

Richard L. Bergmark,

Executive Vice President and

Chief Financial Officer

Named Executive Officers

David M. Demshur, Chairman of the Board and Chief Executive Officer

2018 Global Operations Team



Lawrence Bruno, President

Monty L. Davis, Senior Vice President and Chief Operating Officer

Mark F. Elvig, Senior Vice President, Secretary, and General Counsel

James L. Gresham, Senior Vice President, Business Development

Christopher S. Hill, Senior Vice President and Chief Accounting Officer

Gwendolyn Y. Schreffler, Senior Vice President, Corporate Development and Investor Relations

INDEPENDENT AUDITORS

KPMG LLP KPMG Accountants N.V.

TRANSFER AGENT AND REGISTRAR

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MARKET INFORMATION

Listed on NYSE: CLB US Listed on Euronext Amsterdam Exchange: CLB NA



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Innovative Technology: Impacting Energy Industry Returns

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