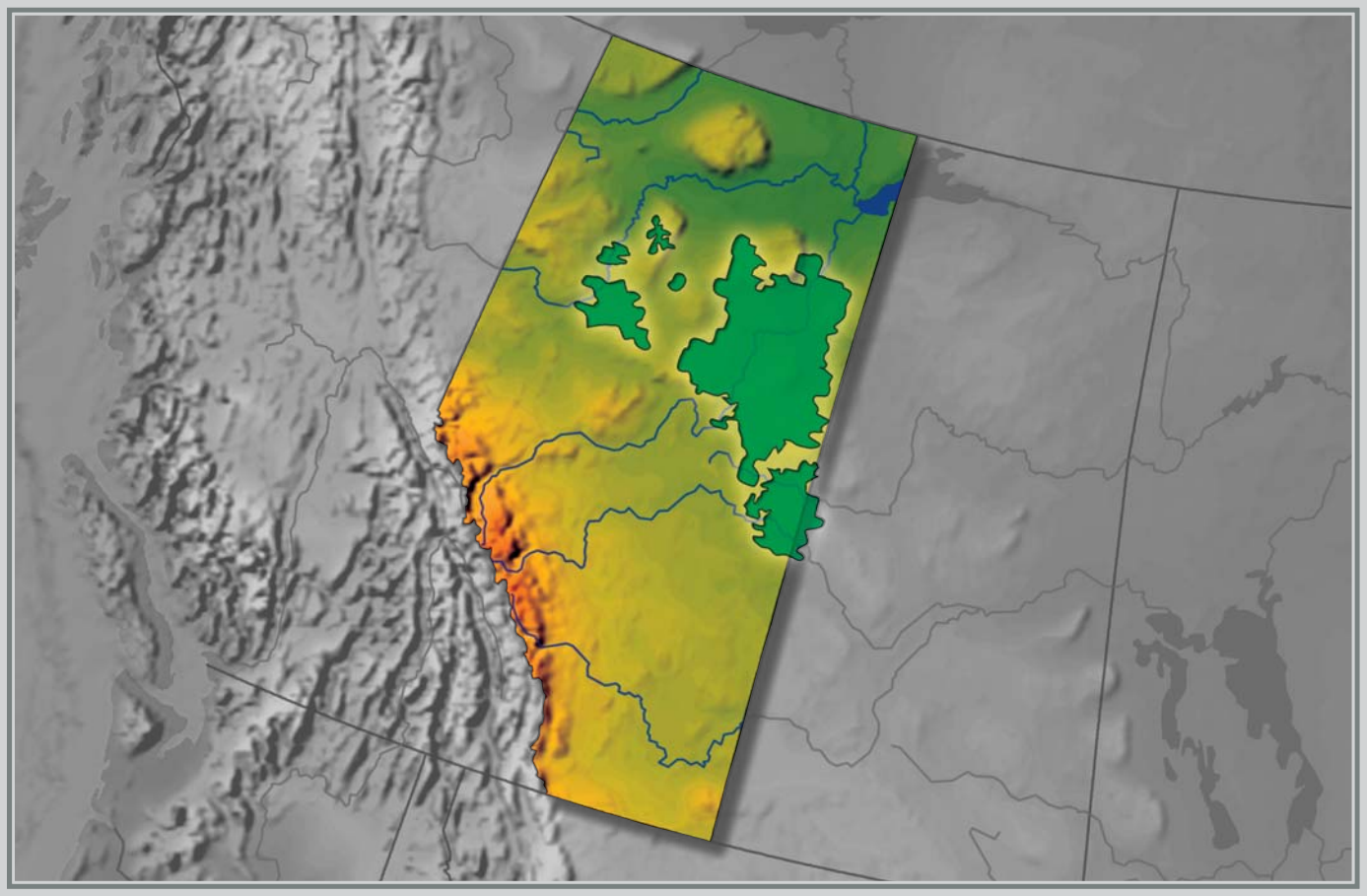
Core Laboratories 2008 Annual Report

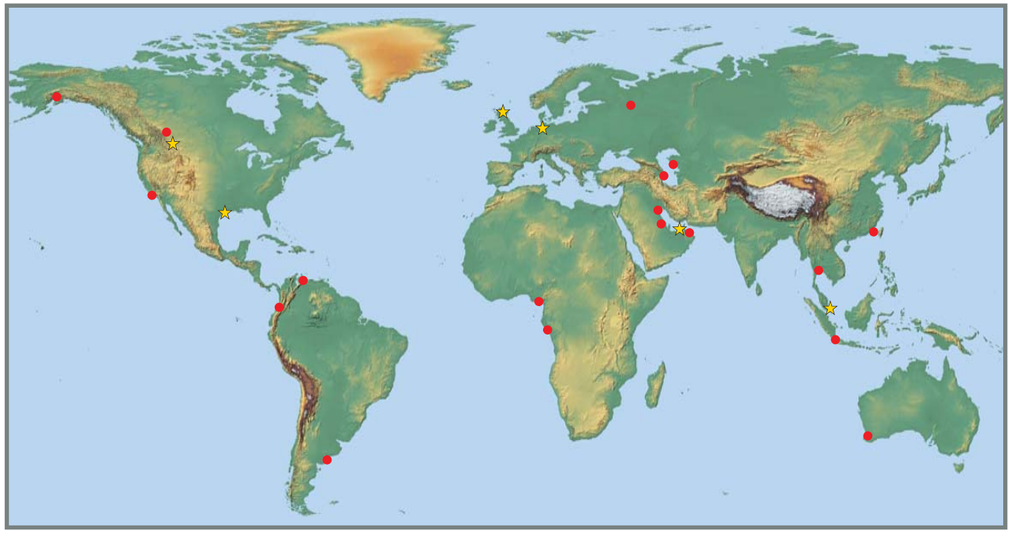
Heavy Oils — Energy's Next Horizon



These three deposits hold more hydrocarbons
than all the Middle East fields combined.
Core's technology is helping to optimize their production.

Core Lab®
RESERVOIR OPTIMIZATION

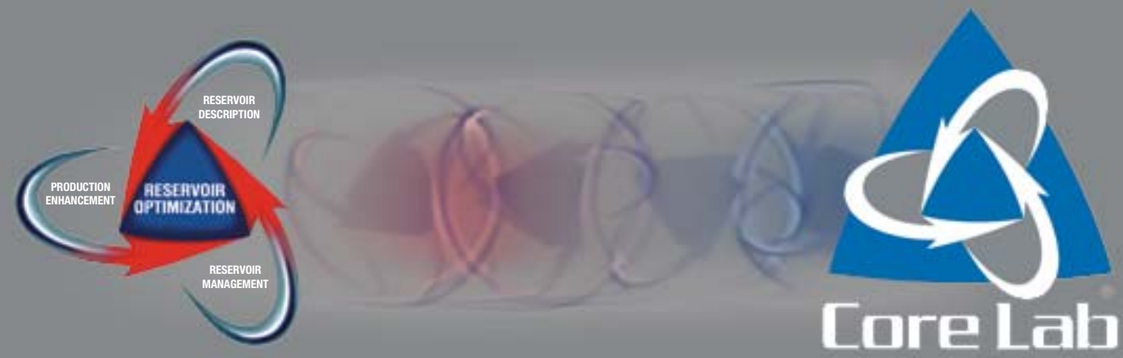
A Global Presence



☆ **Advanced Technology Centers**
Kuala Lumpur, Malaysia
Abu Dhabi, UAE
Rotterdam, The Netherlands
Aberdeen, Scotland
Calgary, Alberta
Houston, Texas

• **Selected Major Regional Operating Centers**
Perth, Australia
Jakarta, Indonesia
Bangkok, Thailand
Shanghai, China
Muscat, Oman
Doha, Qatar
Kuwait City, Kuwait
Baku, Azerbaijan
Aktau, Kazakhstan
Moscow, Russia
Port Harcourt, Nigeria
Luanda, Angola
Edmonton, Alberta
Bakersfield, California
Anchorage, Alaska
Maracaibo, Venezuela
Bogota, Colombia
Buenos Aries, Argentina

Core Laboratories is The Reservoir Optimization Company



Core Laboratories is a leading provider of proprietary and patented reservoir description, production enhancement, and reservoir management services. These services 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.

The Growth Strategies

Continued execution of Core Laboratories' three growth strategies has produced another year of record results. These growth strategies were set in 1994, the year before Core made our initial public offering, and have served the Company and our shareholders well. Over the past several years, Core has been the leading oil-field service company for three-, five-, and ten-year shareholder returns; and our performance in 2008 should serve to extend our market segment domination. During 2008, some of the key developments from our growth strategies were:

1. Develop new reservoir-optimizing technologies.

Core's Super High Efficiency Reservoir Optimization (SuperHERO™) line of perforating charges and gun systems continued to evolve with the introduction of the SuperHERO Plus+™ charge. The SuperHERO Plus+ charge, specifically designed for high performance in gas-shale developments, contains an upgraded high explosive coupled with a modified powdered metal liner. The effectiveness of the charge has increased by up to 20%, delivering additional natural gas flow at the wellbore and increased ultimate recovery of natural gas from shale reservoirs.

2. Leverage Core's international office network.

Core Laboratories, with more than 70 offices in 50 countries, is strategically positioned for growth in both conventional and unconventional crude oil and natural gas developments. Accordingly, we used our Calgary Advanced Technology Center as an operational base to construct the Company's "Canadian Center for Unconventional Oil and Natural Gas Evaluation". The Center will receive reservoir core and fluid samples from the increasingly active Motney, Muskwa, and Utica gas-shale developments and miles of cores from the ongoing Canadian oil-sand projects that are featured in the theme portion of this annual report.

3. Acquire complementary and strategically positioned technologies.

Core Laboratories acquired two strategically positioned businesses in 2008: Cantoni Persa, a specialized laboratory business in Istanbul, Turkey, and Tracewell Services in Parkersburg, West Virginia.

Cantoni Persa will serve as Core's southern Caspian operational base for the significantly increased activity the Company expects in this hydrocarbon-rich region.

Tracewell Services will anchor new business developments in the Marcellus gas-shale play throughout the central and northern Appalachian basin.

The Record Results

Core Laboratories continues to be a uniquely focused, technologically advanced provider of reservoir optimization services to the global petroleum industry. Because long-term worldwide demand for energy will continue to increase, optimization of producing assets is the highest priority of the worldwide energy industry. Core could not be better positioned to meet this challenge.

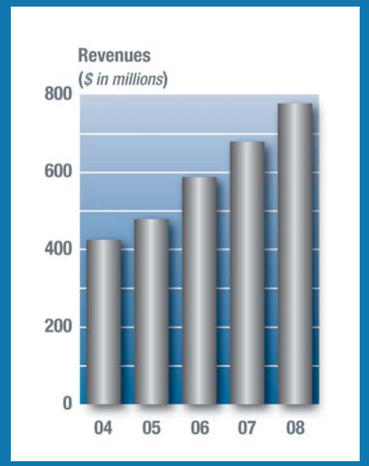
In 2008, Core's continued innovation of new technologies, services, and products; leveraging of our worldwide office network; and acquisition of strategically located companies produced another year of record results. The demand for Core's proprietary and patented reservoir optimization services and products has never been greater. Unprecedented demand produced all-time annual records for:

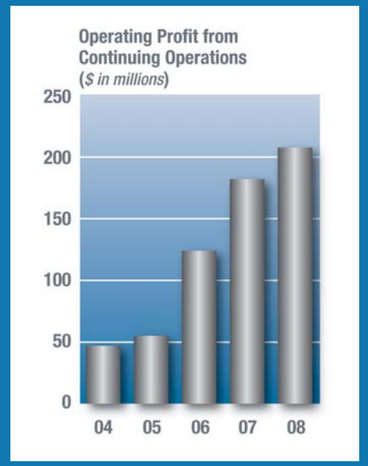
- Revenue
- Operating profit
- Net income
- Earnings per diluted share
- Free cash flow

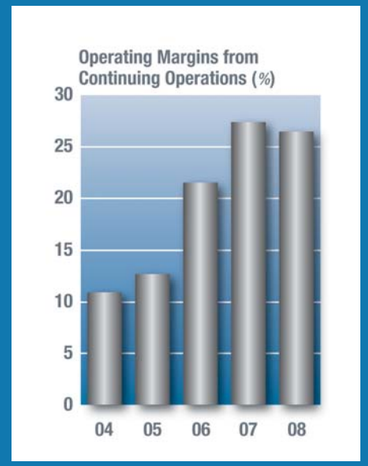
Core will continue to emphasize execution of our time-proven strategies to produce additional growth.

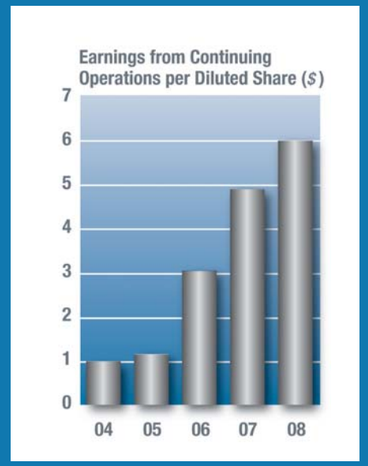
Undoubtedly, the world's demand for hydrocarbons will increase as it becomes more and more difficult to discover and develop large accumulations of conventional crude oil and natural gas. Therefore, Core is developing new operational bases, technologies, and services that will be needed to develop unconventional natural gas and crude oil resources.

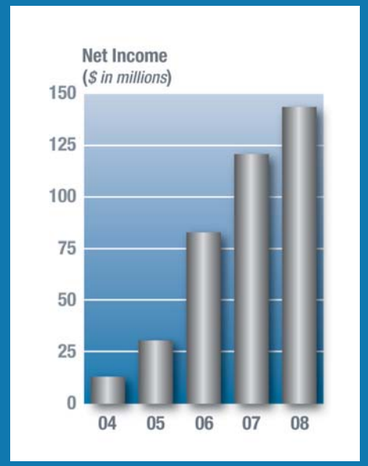
In last year's annual report, we detailed Core's focus on North American gas-shale developments; in this year's report, we examine the importance of nonconventional and heavy oil deposits worldwide, with special emphasis on Canadian oil-sands. Heavy oils will be a primary source of the energy required in the future, and we will make sure that Core Laboratories is positioned to meet the challenges of producing that energy.











Message from the Executive Team

Core Laboratories and our thousands of shareholders enjoyed another record-setting year in 2008, a year that saw many milestones achieved by the Company. In July of 2008, Core Laboratories celebrated our tenth successful year on the New York Stock Exchange. Earlier in the year, Core was recognized by *The Wall Street Journal* for having the highest average three-, five-, and ten-year shareholder returns of any major publicly listed oilfield service company over the same period.

The table on the facing page lists Core and eleven other well-known oilfield service companies. Because most of Core's largest shareholders are long-term investors – our largest shareholder has owned shares for over ten years – they have enjoyed superior returns on their investments. In addition, of the largest 1,000 companies traded on Wall Street, Core was listed ninth in five-year shareholder returns for the second consecutive year.

Core would go on to establish the Company's most successful and profitable year in 2008; and according to quotes from *Bloomberg Business News*, for yet another year, Core delivered the highest average three- and five-year shareholder returns of any major publicly listed oilfield service company. Crude oil demand had reached 87.5 million barrels per day, and the price for a barrel of black gold had reached $147.50. Liquefied natural gas (LNG) and heavy oil developments, including enormous Canadian oil-sand reserves, were proceeding at unprecedented speed. More hydrocarbons were needed as the worldwide output neared peak production. Global growth and economic activities were at all-time highs, led by emerging economies in Brazil, Russia, India, and China.

As global economies slowed during the second half of 2008, overall hydrocarbon demand also dropped. Commodity prices contracted, as did many marginal energy developments. However, long-term demand for hydrocarbons will continue to increase, and Core Laboratories is positioning for long-term demand growth. Deepwater, gas-shale, and heavy oil developments will be the key to meeting demand for increased supplies. Core Lab constructed the Canadian Center for Unconventional Natural Gas and Crude Oil Evaluation in Calgary and expanded our operating facilities around the globe. Hydrocarbon demand may be down for the period of an economic recession; but all recessions end, and economic activity resumes and increases. When demand is once again robust, Core Laboratories will be ready as we adhere to our growth strategies that continue to produce record results.

Our laser focus on developing technologies that enable our clients to produce more oil and natural gas on a daily basis and to maximize total hydrocarbon recovery from their fields produced record financial results again in 2008. New records and the improvements they represent over 2007 – which was also a record year – include:

- Revenue of $781,000,000 – up 16%
- Operating profit of $207,000,00 – up 12%
- Net income of $144,000,000 – up 19%
- Earnings per diluted share of $6.00 – up 21%
- Cash from operations of $155,000,000 – up 23%
- Free cash flow of $124,000,000 – up 22%

All three of Core's operating segments – Reservoir Description, Production Enhancement, and Reservoir Management – established new annual records for revenue and operating profit. Operating margins expanded to over 26%. Those margins resulted from increased market acceptance for, and further market penetration by, our reservoir-optimizing technologies, some of which are highlighted in the theme section of this annual report.

The Company continued to generate significant amounts of cash from operations and free cash flow. Core's capital expenditure program of $31,000,000 was larger than our $21,000,000 of annual depreciation, as the Company invested in growth projects worldwide. Operating activities generated $155,000,000 in cash in 2008. Free cash flow, defined as cash from operating activities minus capital expenditures, was $124,000,000, up over 22% from 2007 levels.

Core's management rings the NYSE closing bell to mark the tenth anniversary of the Company's listing.

Core's board of supervisory directors at the NYSE.

Company	Three-Year Average Return	Five-Year Average Return	Ten-Year Average Return
Core Laboratories	75%	62%	21%
National Oilwell Varco	61%	46%	16%
Transocean	50%	44%	12%
FMC Technologies	52%	41%	NA
Schlumberger	44%	38%	12%
Smith International	41%	36%	17%
Halliburton	26%	34%	5%
Cameron International	53%	31%	12%
Weatherford International	39%	28%	15%
Baker Hughes	25%	22%	8%
Nabors Industries	2%	9%	6%
BJ Services	2%	9%	11%
Industry Average	33%	29%	11%

Average shareholder returns for publicly listed oilfield service companies (1998 – 2007).

The Company continued to return free cash to the owners – our shareholders – through our Share Repurchase Program and the initiation of a regular quarterly dividend. The Company also announced a special dividend.

During 2008, Core returned over $32,000,000 to our shareholders by repurchasing approximately 294,000 shares. Since the inception of the Share Repurchase Program in October 2002, Core has returned over $600,000,000 to our shareholders using funds from the Company's free cash flow, sale of a discontinued business, and the convertible note offering. Core has repurchased approximately 15,340,000 shares at an average share price of about $41.00. During the five-plus years of the Company's Share Repurchase Program, the number of outstanding diluted shares has fallen to the current level of just under 23,300,000, the lowest level since 1997. Essentially, Core has repurchased 46% of the Company's shares for the benefit of the shareholders over the past five years. At a special Shareholders' Meeting held on 29 January 2009, Core received authorization to repurchase up to an additional 25.6% of the Company's outstanding shares.

Core initiated a $0.40 regular annual dividend during the third quarter of 2008. The Company also announced a special 2008 dividend of $1.00 during the third quarter. Combined, the regular and special dividends returned an additional $27,600,000 to our shareholders in 2008.

The Company also took advantage of distressed financial markets to repurchase some of our outstanding $300 million 0.25% Senior Exchangeable Notes at a significant discount. The Company repurchased debt with a notional value of $61,000,000 for $52,677,000, yielding a gain of $8,323,000 and reducing our long-term debt by over 20%. Core plans to continue to look for the best ways to apply our free cash to maximize shareholder returns in the future.

Share ownership among Core's executive and senior management and our supervisory board of directors remains over 4% — one of the highest among publicly traded companies in the oilfield services universe — and it aligns the interests of Core's management and board directly with the interests of our shareholders. The board and management of Core remain committed to being the most shareholder-friendly company in the oilfield services universe and continuously explore the best ways to boost shareholder value.

Segment Highlights

Core Laboratories reports financial results under our three operating segments – Reservoir Description, Production Enhancement, and Reservoir Management. The three reporting segments are interrelated, and most large, sophisticated projects on which Core works include technology and services from all three segments.

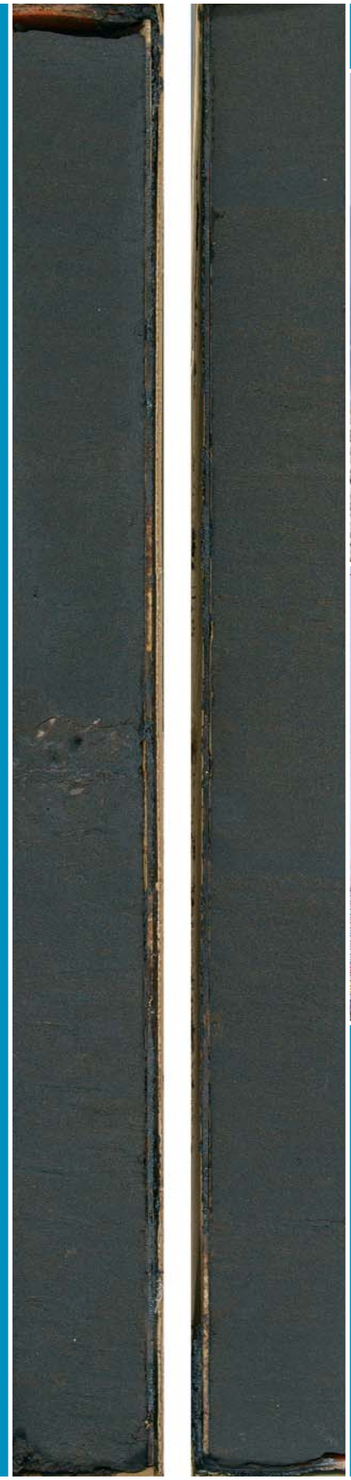
Reservoir Description

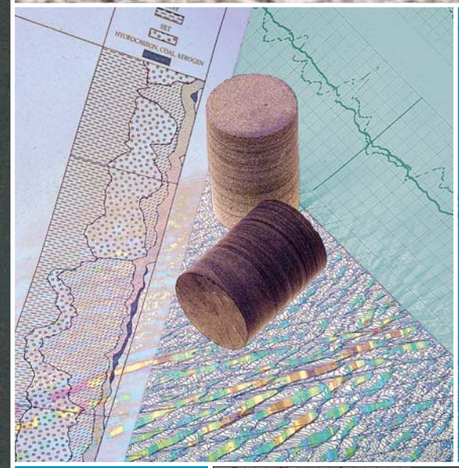
Reservoir Description operations once again reported record revenue and operating profit in 2008. Revenue increased 16% to $435,000,000, and operating profit increased to over $100,000,000. Revenue growth was driven by continued expansion of internationally based crude oil-related projects, North American projects related to gas-bearing shale reservoirs, and projects related to Canadian oil-sand developments, among others.

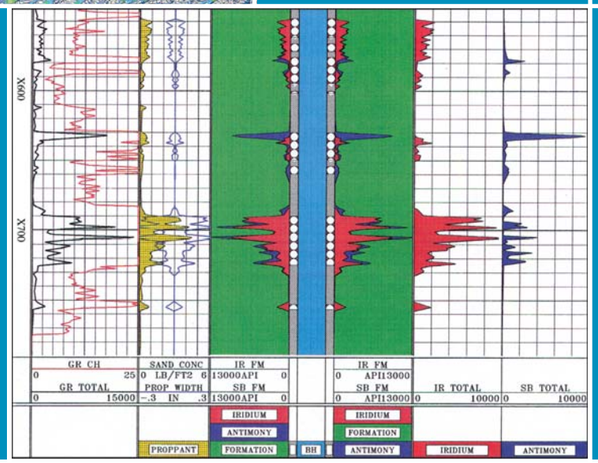
Reservoir Description services are used to describe the entire reservoir system, which includes the porous and permeable reservoir rock and the three reservoir fluids – crude oil, natural gas, and water – that are present in all the world's oilfields.

Tens of thousands of feet of cored reservoir samples are analyzed in the Company's worldwide network of laboratories. Measurements and calculations are made to determine porosity, permeability, grain density, mineralogy, electrical properties, dynamic flow properties, rock strength, and hundreds of other analytical parameters.

Reservoir fluid samples are analyzed for API gravity, sulfur content, hydrocarbon content, BTU value, viscosity, and fluid compatibilities. Crude oils are analyzed for crude oil quality and gasoline content, and many are distilled to quantitatively determine the precise amounts of gasoline, diesel, kerosene, fuel oil, and heavier products that will be produced when an oil is refined. Core's data sets are also used to calculate the value of the crude oil.







Production Enhancement

Production Enhancement operations posted record revenue, operating profits, and operating margins in 2008. Revenue increased 20% to $293,000,000; operating profit increased 35% to $93,000,000; and operating margins expanded 360 basis points to 32%. These results reflect the growing market acceptance of cutting-edge, reservoir-optimizing technologies, services, and products introduced by Core.

Production Enhancement services and products are used to increase the daily production of hydrocarbons and to maximize ultimate hydrocarbon recovery from our clients' producing fields.

Demand for Core's patented, fracture-stimulation diagnostic technology is at an all-time high. SpectraScan™ and SpectraStim™ services are utilized to determine the effectiveness of multi-zoned reservoir fracture-stimulation programs. These patented technologies indicate zones that have not been hydraulically fractured, or have been understimulated, and are yielding less than optimal hydrocarbon flow. Statistically, Core has determined that only one in three multi-zoned reservoir-stimulation programs performs as planned. There is growing client recognition that fracture-stimulation diagnostic technology is a necessity for optimizing hydrocarbon production, especially from gas-shale reservoirs.

Core's Super High Efficiency Reservoir Optimization (SuperHERO™) perforating charges were introduced to the North American gas-shale market in early 2007. This was followed by the successful introduction of Core's SuperHERO Plus+™ charges in 2008. These charges have proved very effective in gas-shale completions.

The successful introduction of SuperHERO and SuperHERO Plus+ charges to the North American marketplace is being mirrored internationally by Core's previously introduced HERO™ technology. Core Lab engineers have identified hundreds of hydrocarbon reservoirs outside North America in which HERO charges can mitigate formation damage during perforation, thereby helping to maximize hydrocarbon flow and ultimate recovery.

Reservoir Management

Reservoir Management operations also reported record revenue, operating profit, and operating margins in 2008. Revenue increased 2% to $52,000,000; operating profit increased to $16,200,000; and operating margins expanded to 31%.

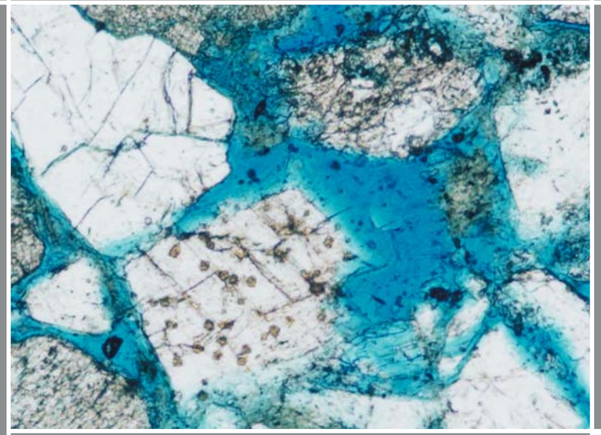
Reservoir Management is the Company's most scalable business segment. Its scalability is related to integrating large numbers of Reservoir Description and Production Enhancement data sets into industry-leading, multi-client studies requested by a worldwide client base.

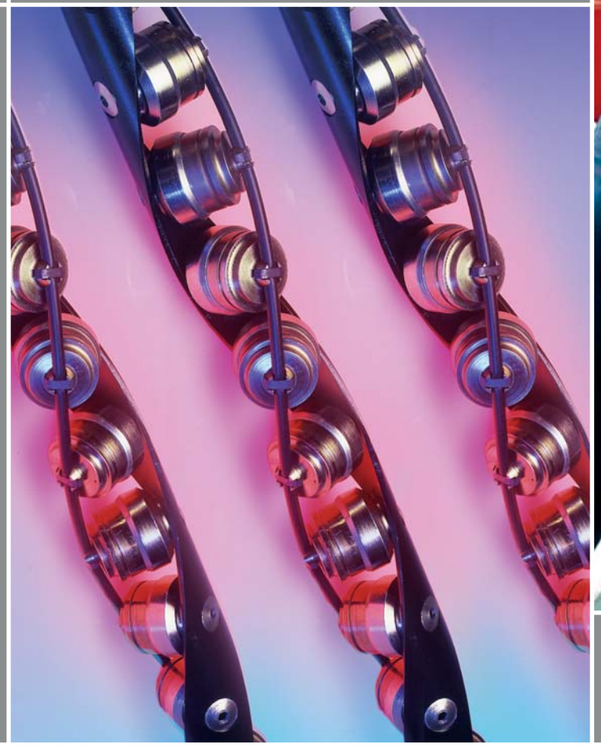
Core's geological, petrophysical, and engineering teams continued to develop regional reservoir studies, utilizing data from thousands of feet of cored intervals. Two studies, *Reservoir Characteristics and Production Properties of Gas Shales* and *Geophysical, Petrophysical and Geomechanical Properties of Tight Gas Sand Reservoirs*, have generated more industry support and participation than any other studies in Company history. At year-end, the *Gas Shales* study had over 60 participating companies.

Bright Future

Core Laboratories' keen focus on providing technologies and services to help our clients produce incremental hydrocarbons from their producing fields has led to another record year for the Company.

As the long-term demand for hydrocarbons will continue to grow, we could not be better positioned. Core Laboratories – the oilfield leader in providing reservoir optimization technologies and services – will be relied on to help companies produce more crude oil and natural gas from existing fields. Opportunities abound, and there is no better time to apply Core's technologies worldwide.





Heavy Oils

Energy's Next Horizon

During the first half of 2008, global economic expansion reached its highest level in history. Many large countries, including Brazil, Russia, India, and China, realized unprecedented job creation from infrastructure growth and the production of record levels of gross domestic output and exports.

Consequently, the global demand for hydrocarbons, the world's most efficient, effective, and widespread source of energy, also reached an all-time peak. Table 1 lists the top ten hydrocarbon producers in the world for 2008, and all were producing at maximum output. It is interesting that only two of the ten listed countries — Canada and China — have not reached peak hydrocarbon production. The other eight top producers have passed peak oil production and are now declining on a year-over-year basis.

Also note that OPEC members Venezuela, Nigeria, Algeria, Libya, Ecuador, and Iraq are not in the world's top ten hydrocarbon producers. These countries are unlikely to move into the top ten in the future because they too have passed peak oil production and now have declining production. In fact, 55 of the 65 countries in the world that produce significant amounts of hydrocarbons are now in permanent decline. As Core Lab engineers have noted in past annual reports, "Even today's best technology cannot alter the laws of physics, and none of the world's petroleum reservoirs are exempt from these laws. The decline curve always wins."

The high level of world demand for hydrocarbons in early 2008 pulled down inventory levels because short-term demand was exceeding the world's ability to supply. Because of this temporary short-term supply and demand imbalance, prices for all hydrocarbon-based energy supplies – crude oil, natural gas, and heavy oils – skyrocketed. Global crude-oil prices surpassed $147 per barrel, and the entire price deck for all other hydrocarbon energy sources followed.

In mid-2008, the world was producing approximately 87.5 million barrels of oil and an estimated 285 billion cubic feet of natural gas per day. Combined, these energy sources equaled 135 million barrels of oil equivalent being produced and consumed every day. Because the world's conventional crude oil production peak is estimated to be near 88 million barrels per day, increased energy needs will have to be satisfied by unconventional sources for natural gas, such as the gas-shale developments featured in last year's annual report, and heavier crude oils, which we feature in this year's report.

The total volume of original in-place heavy oil worldwide is estimated at over 2.5 trillion barrels, compared with an estimated recoverable reserve base of approximately 1.0 trillion barrels for conventional crude oil. Of the 1.0 trillion barrels of conventional crude oil, Middle East countries hold approximately 750 billion barrels (Figure 1).

The largest, most accessible reserves for unconventional heavy crude oil deposits are located in Canada, which currently produces approximately 1.3 million barrels per day of oil equivalent from heavy oil-sand deposits. Canada currently ranks fifth among the world's energy producers, but increased heavy oil production may move this country into the fourth position over the next several years. Announcements in 2008 by Total in Madagascar, Shell in Russia, and Italian company ENI in the Republic of Congo may indicate further oil-sand development potential outside of Canada.

Figure 2 shows the three main regions in Alberta that contain the vast majority of Canada's heavy oil deposits. The Peace River, Cold Lake, and giant Athabasca oil-sand deposits are some of the largest in the world.

Table 1

Rank	Country	Oil Production (thousands of barrels of oil per day)	Natural Gas Production (billions of cubic feet per day)	Total Hydrocarbon Production (thousands of barrels of oil equivalent per day)
1	Russia	9,760	53.2	18,341
2	United States	4,895	60.0	14,572
3	Saudi Arabia	9,365	7.2	10,526
4	Iran	3,920	9.7	5,485
5	Canada	2,663	14.5	5,002
6	China	3,784	7.2	4,945
7	Mexico	2,759	7.0	3,888
8	United Arab Emirates	2,610	4.2	3,287
9	Norway	2,057	6.8	3,154
10	Kuwait	2,615	1.5	2,857

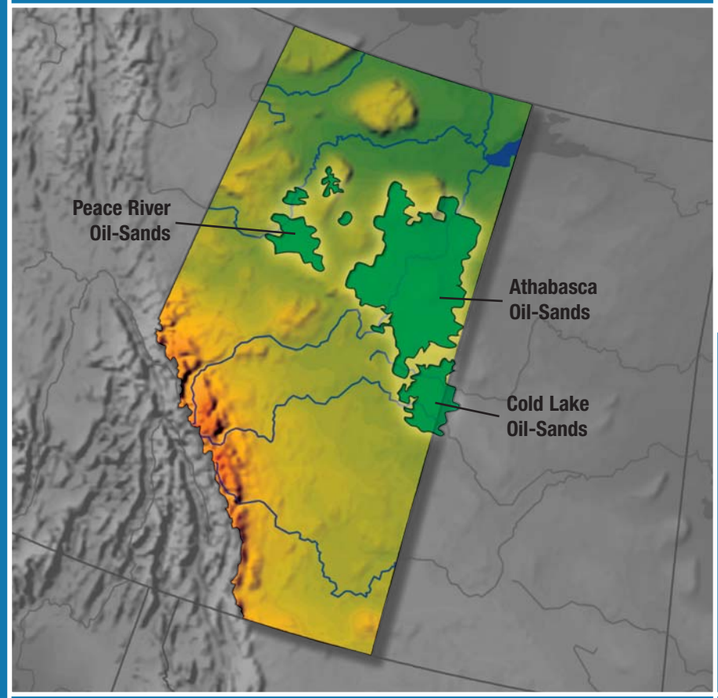


Figure 2
Alberta's three main oil-sand deposits

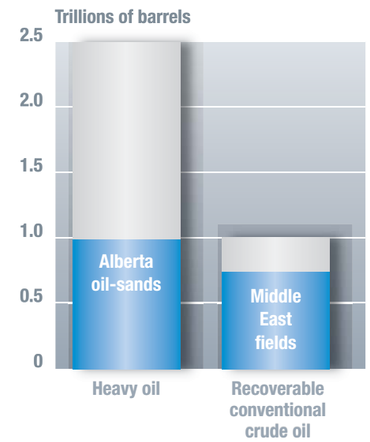


Figure 1
Total volume of original in-place heavy oil versus recoverable conventional crude oil worldwide

As shown in Figure 3, the hydrocarbons contained in these oil-sand deposits were generated high in the Canadian Rocky Mountains, some 400 miles to the west, about fifty million years ago. Geothermal flows of hydrocarbon-enriched waters passed through the deeply buried stratigraphic columns of rocks that dipped down to the east. These waters cooled as they reached the surface sediments in northeastern Alberta, and the hydrocarbons dropped out of solution to form the oil-sand deposits. As these deposits weathered, the light-hydrocarbon components were consumed by microbes or escaped to the atmosphere, leaving hundreds of billions of barrels of heavy oil deposits.

The Athabasca, Peace River, and Cold Lake regions are estimated to contain over 1.0 trillion barrels of original in-place heavy oil. Ultimate recovery factors range from 2% to 15%, with total estimated recoverable reserves of more than 100 billion barrels applying current technologies. Approximately one-half of the reserves is exploitable by conventional surface mining techniques; the other half is more deeply buried and can be exploited using in-situ Steam-Assisted Gravity Drainage (SAGD) methods.

Core Laboratories plays a major role in enabling oil companies to optimize the development of oil-sand deposits, both from mining and SAGD projects. The Company helps our clients evaluate tens of miles of conventional core samples (such as the slabs in Figure 4) that are drilled throughout the three major areas of development in northern Alberta. The coring season starts in early winter when the marshes and muskegs are frozen solid enough to support a drilling rig.

When developing a site that will be surface mined, a grid pattern of coring is planned over an extensive area. As shown in Figure 5, these areas can be dozens of square miles and can include hundreds of coring locations.

Figure 6 shows a cross-section of an area to be surface mined and the sites where cores will be taken to determine the thickness of the oil-sand deposit. Surface soil and sediments, usually less than 200 feet thick, will need to be removed to exploit the deposit.

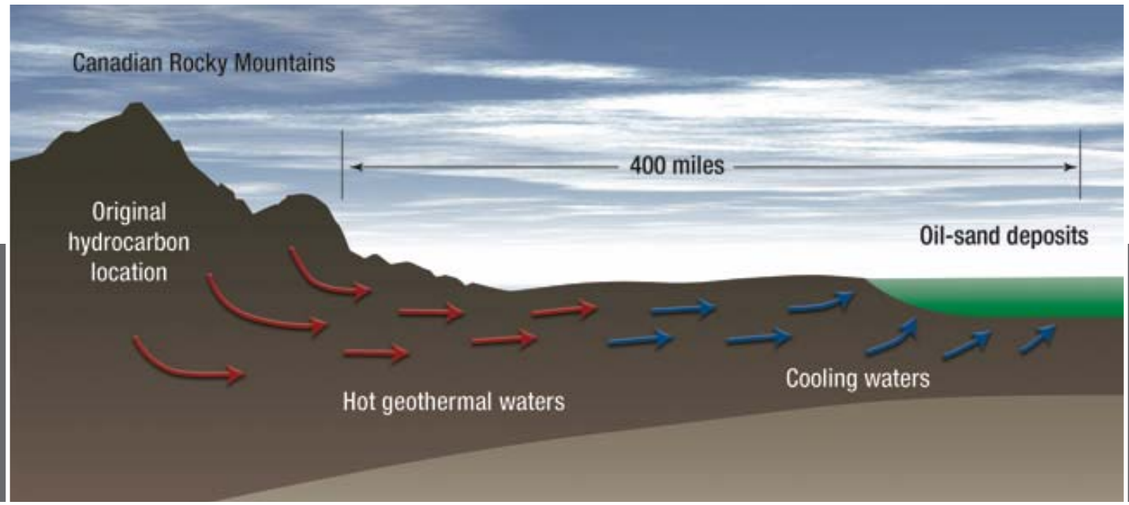


Figure 3
Origin of the Alberta oil-sands (J.H.N. Wennekers, "Massive Rock Ploughs Formed Structures in Western Canada", Oil and Gas Journal, 11 June 2007)

Figure 4
Slabbed whole core samples from the Alberta oil-sands

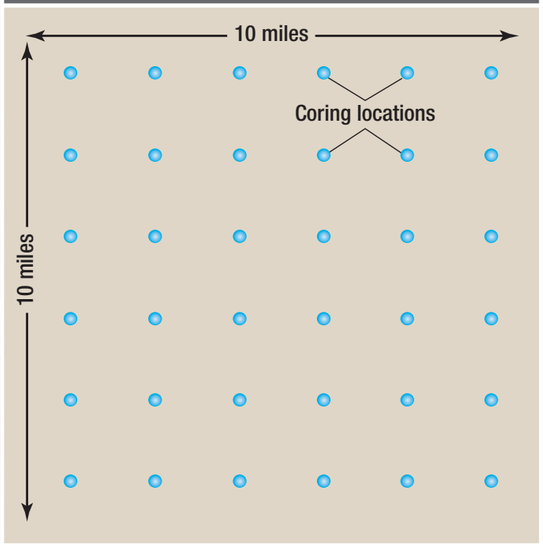


Figure 5
Coring grid pattern for a surface mining operation

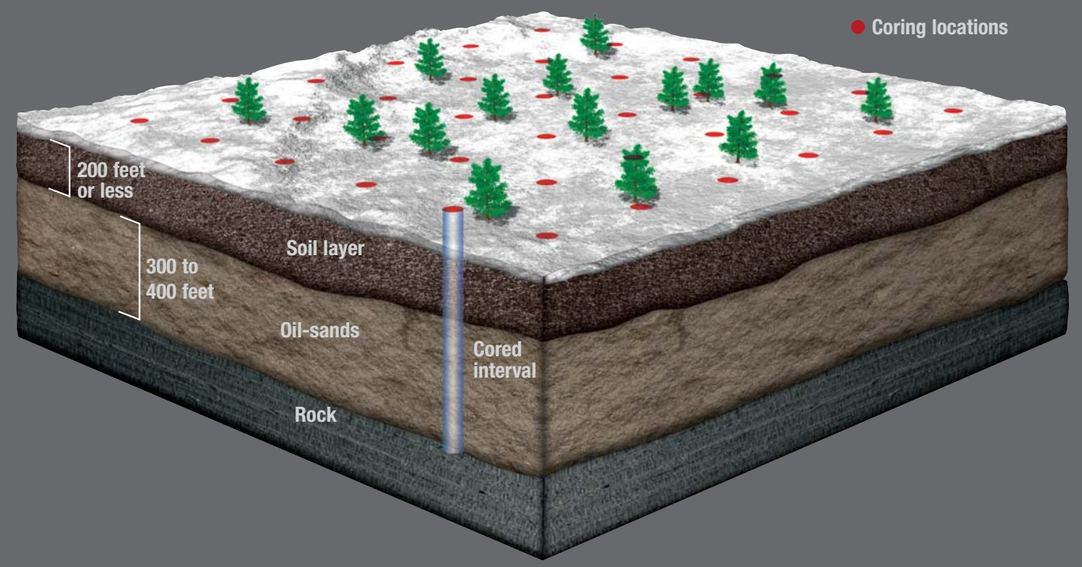


Figure 6
Cross-section of oil-sand deposit to be exploited

Core Lab personnel are usually involved in planning the most effective, comprehensive coring program.

- They formulate coring locations, densities, and grid patterns to fully evaluate the area to be exploited.
- When coring begins, they are at the wellsite to recover the core and begin processing it.
- They record well location and depth for each cored interval cut from the oil-sand deposit.
- They collect oil-sand cores inside plastic sleeves to maintain the integrity of the core, which typically covers the entire thickness of the reserve, ranging from approximately 100 to 300 feet.
- They cut and box the cores in 5-foot lengths and freeze them with dry ice (or the ambient sub-freezing temperature).

After cores have been recovered from the field (Figure 7), they are trucked to Core Lab's newly constructed Canadian Center for Unconventional Natural Gas and Crude-Oil Evaluation in Calgary (Figure 8).

At over 40,000 square feet, the new center, opened in December 2008, is the largest facility dedicated to unconventional hydrocarbon plays in the world. It represents Core's long-term commitment to support our clients' expansion plans for gas-shale and heavy oil resources in Canada.

In this state-of-the-art facility, cores are sorted, then transferred to a freezer (Figure 9) for storage at -20°C for at least 12 hours to minimize water and hydrocarbon loss and textural disruption when the core is cut later for analysis. After the cores are removed from the freezer, they are logged using gamma rays to aid in the selection of samples for analysis and for depth-correction of wireline logs.

Next, the core is sawed longitudinally into two slabs. One slab is kept frozen for subsequent sampling. The other slab (Figure 10) is laid out, allowed to dry, and geologically described. This slab is also used for depth-correcting wireline logs, core photography, and sample selection. After describing the core, the geologist indicates which analyses will be completed on which samples (Figure 11). Core Lab then conducts a detailed analytical program to characterize the oil-sand cores (partially described in Table 2). Many of these techniques are proprietary or patented by Core Laboratories.

The data sets generated from Core's analytical program support fundamental decisions about the most efficient and effective methods to develop and exploit the oil-sand deposit. One application of these data sets is development of contour maps of the oil-sand deposit (Figure 12). These maps display various attributes of the oil-sand deposit that can dictate how the deposit will be exploited through surface mining or SAGD methods.

Figure 7
Recovery of oil-sand cores

Figure 8
Canadian Center for Unconventional Natural Gas and Crude-Oil Evaluation

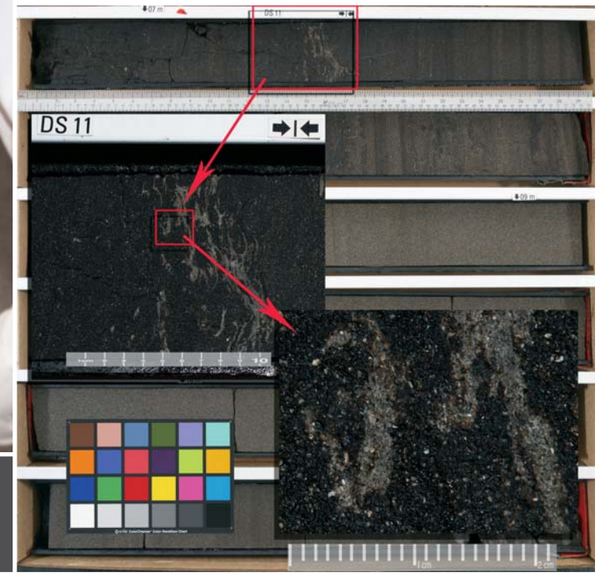
Figure 9
Cores stacked inside a giant storage freezer

Property Analyzed	Value / Application	Methodology
Fluid Saturation	Provides accurate bitumen, water, and sand percentages. This information is essential for optimizing in-situ SAGD and mining operations.	Measured using the Dean Stark extraction method. Core Lab has developed a proprietary method for Dean Stark sampling which minimizes water contamination, making the analysis more accurate.
Porosity	Defines the hydrocarbon storage volume in the reservoir rock. These measurements are used to optimally position the horizontal wellbores in SAGD operations.	Measured at simulated overburden pressures on one-inch cylindrical samples contained in metal sleeves that prevent the friable oil sand from collapsing.
Permeability	Describes the interconnectedness of the pore spaces that permit hydrocarbon flow through the reservoir rock. These measurements are used to optimally position the horizontal wellbores in SAGD operations.	Measured at simulated overburden pressures on one-inch cylindrical samples contained in metal sleeves that prevent the friable oil sand from collapsing.
Grain Density	Identifies sand, shale, and cemented zones.	Changes in rock composition are identified by indication of mineral content.
Particle Size Distribution	These data are essential to the optimal design of screens and liners to minimize sand production in SAGD operations and sedimentation or scouring in pipelines and production pumps. The measurements are also used to design extraction and upgrading plants and to determine the size of the waste tailings pond needed to store the extracted sand material.	The clean and dry sand residue from the Dean Stark analysis is often analyzed by laser diffraction to provide grain size distribution.
Presence of Swelling Clays	One of the main factors that dictates the size of tailing ponds is the amount of swelling clay being dumped into them. The higher the concentration of expandable clay, the larger the tailing pond needs to be.	Methylene blue, a cationic dye, is used as a swelling clay indicator.
Soluble Ions	Determines the salinity of bitumen/water froth in processing, which determines the speed at which fines separate from the bitumen. The ionic content of the water also determines scaling and corrosion tendencies.	Chemical and chromatographic analyses, including proprietary techniques.
Petrology	Along with X-ray diffraction and scanning electron microscopy techniques, mineral compositions determined from petrologic analyses are used to optimize SAGD operations.	Core has developed a proprietary technique for preparing oil-in-place thin sections for petrographic analysis that creates minimal disruption in the unconsolidated oil-sand samples and preserves the delicate clay structures within the pore system.
Formation Damage Potential	Helps determine the best fluids for minimizing formation damage.	Core uses proprietary equipment and procedures to help clients determine the potential for formation damage – and how best to avoid it.
API Gravity/Viscosity	Determines the density and transmissibility of the bitumen/heavy oil.	Chemical and physical measurements.
Elemental Analyses	Determines the levels of sulfur, nitrogen, and other elements contained in the oil.	Chemical and chromatographic analyses.
Heavy Oil Distillation	Determines the various hydrocarbon components contained in the heavy oil/bitumen and the ultimate value.	Incrementally increasing temperatures to fractionate the heavy oil into its components.
Blending Tests	Determines the most effective hydrocarbon blends to promote ease of transport.	Chemical and physical tests for properties, including viscosities and API gravities.

Table 2

Figure 10
Core slabs ready for geologic description

Figure 11
Core photos indicating samples for detailed analyses



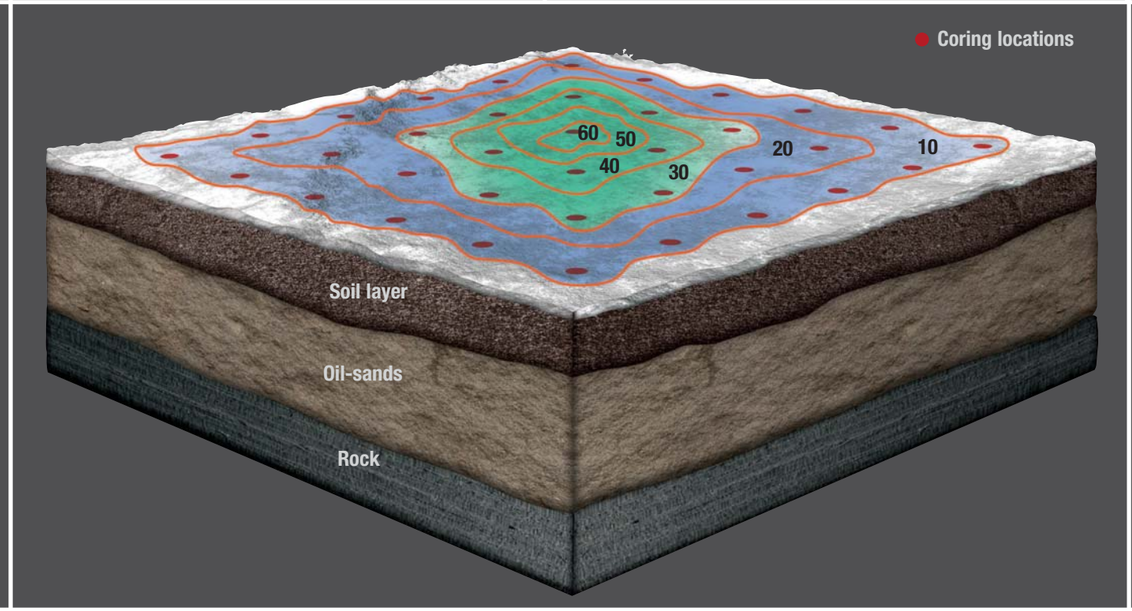


Figure 12
Contour map of bitumen richness

One key set of data is the concentration of heavy oil or bitumen in the oil-sand. Contour maps, such as the one represented by Figure 12, show which part of the deposit will yield the richest pay in barrels per ton of oil-sand. By comparing a contour map of bitumen richness with a map of bitumen recovery factors (Figure 13), an operator can determine which deposits would be the most economical to exploit (the areas shaded in green in this example; areas shaded in blue would be uneconomical). Exploiting areas that have the highest bitumen yield maximizes cash flow that can be reinvested to exploit other areas of the deposit.

After they have been mined, the sands are trucked to an upgrader plant, where the heavy oil or bitumen is extracted and transformed to a hydrocarbon product that can then be refined into various consumer products, such as gasoline or diesel fuel.

When oil-sand deposits are buried hundreds, or even thousands, of feet below the surface, the in-situ SAGD technique becomes the economic alternative. The deeply buried oil-sand deposit is extensively cored in a grid pattern very similar to the surface-mined deposit. Once again, contour maps are generated to identify the zones that will yield the greatest amount of bitumen when they are flooded with steam.

Using steam to decrease the viscosity of the bitumen and drive it to a producing wellbore has proved an effective enhanced oil recovery (EOR) technique. Core has played an important role in developing technologies to maximize the efficiencies in steam floods.

In SAGD projects, a horizontal well is drilled into the heavy-oil or oil-sand reservoir to maximize exposure to the productive zone. Since heavy hydrocarbons will not flow freely into this production well, a second horizontal well is drilled above it. Steam is then injected into the upper wellbore to mobilize the heavy oil. The super-heated, and now less-viscous, oil can then flow downward as gravity pulls it into the producing well (Figure 14).

To ensure the entire production zone is effectively treated with the injected steam, Core Laboratories uses patented reservoir monitoring equipment. One example: Core's ERD™ Electrically Resonating Diaphragm sensors are used to evaluate the SAGD process during warmup, steam chamber growth, and production. Accurate, reliable downhole data from these very-high-temperature sensors are used to minimize steam-to-oil ratios, thereby dramatically reducing operating costs. Bitumen-rich zones, identified by Core's analytical data sets, are subjected to focused steam injections, significantly increasing the bitumen production associated with these technologically advanced SAGD projects.

Core Laboratories continues to develop new proprietary and patented technologies needed for optimum development of Canadian oil-sands. In Calgary, Core introduced client-specific proprietary procedures to determine the salinity of bitumen-carrying water, characterize the types and percentages of swelling clay particulates, and measure the particle size distribution of produced sands. The combination of these proprietary technologies generates data sets that are essential to designing upgraders that maximize bitumen extraction and to optimizing pipeline size and bitumen/diluent flow in order to minimize scouring of the pipeline wall.

Core's technologies are helping to ensure economical development of oil-sand deposits even at today's lower oil prices. As the worldwide economy grows and strengthens, the demand for hydrocarbons will increase, and commodity prices will rise. The development of heavy-oil deposits will play an important role in meeting the increased demand for hydrocarbons.

By planning ahead now, Core Laboratories will be ready to assist our clients in developing the heavy oil deposits that are Energy's Next Horizon.

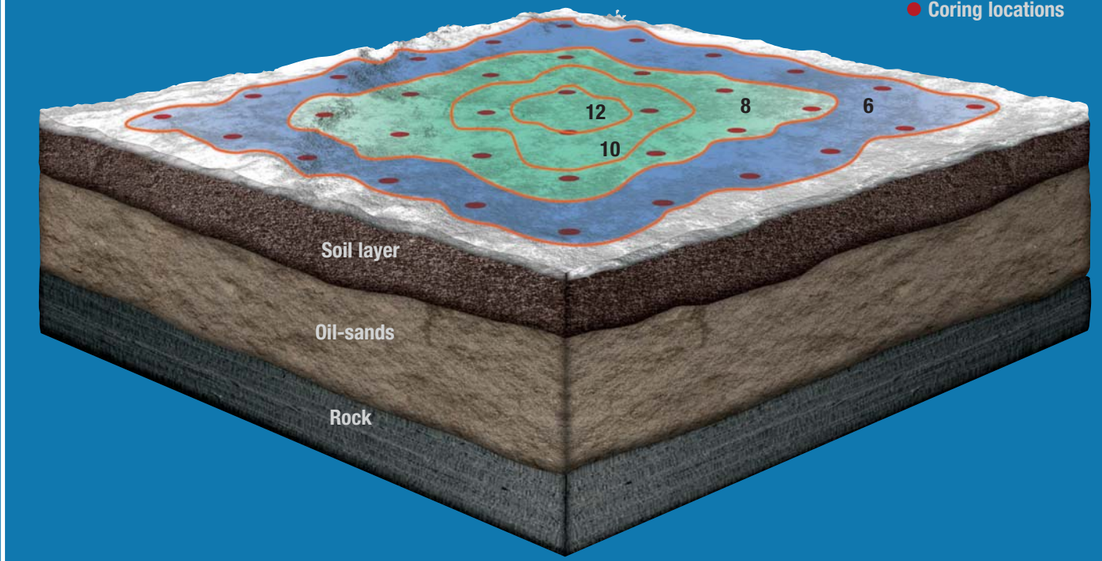


Figure 13
Contour map of bitumen recovery factors

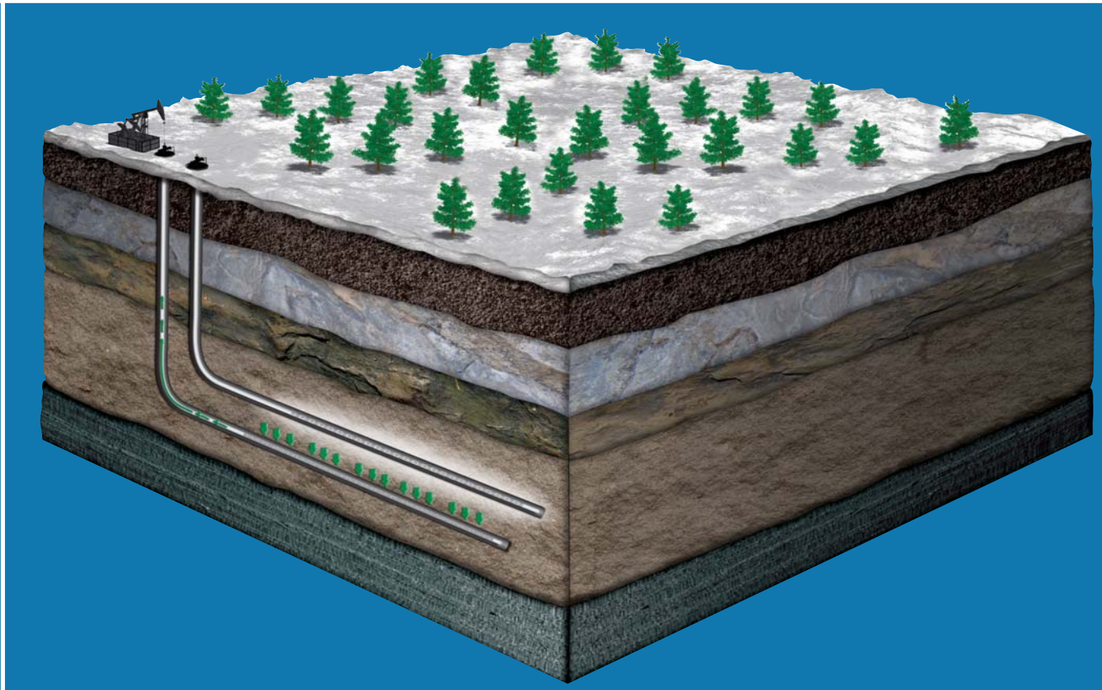


Figure 14
Horizontal wellbores in a SAGD recovery project

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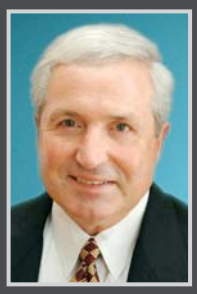

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