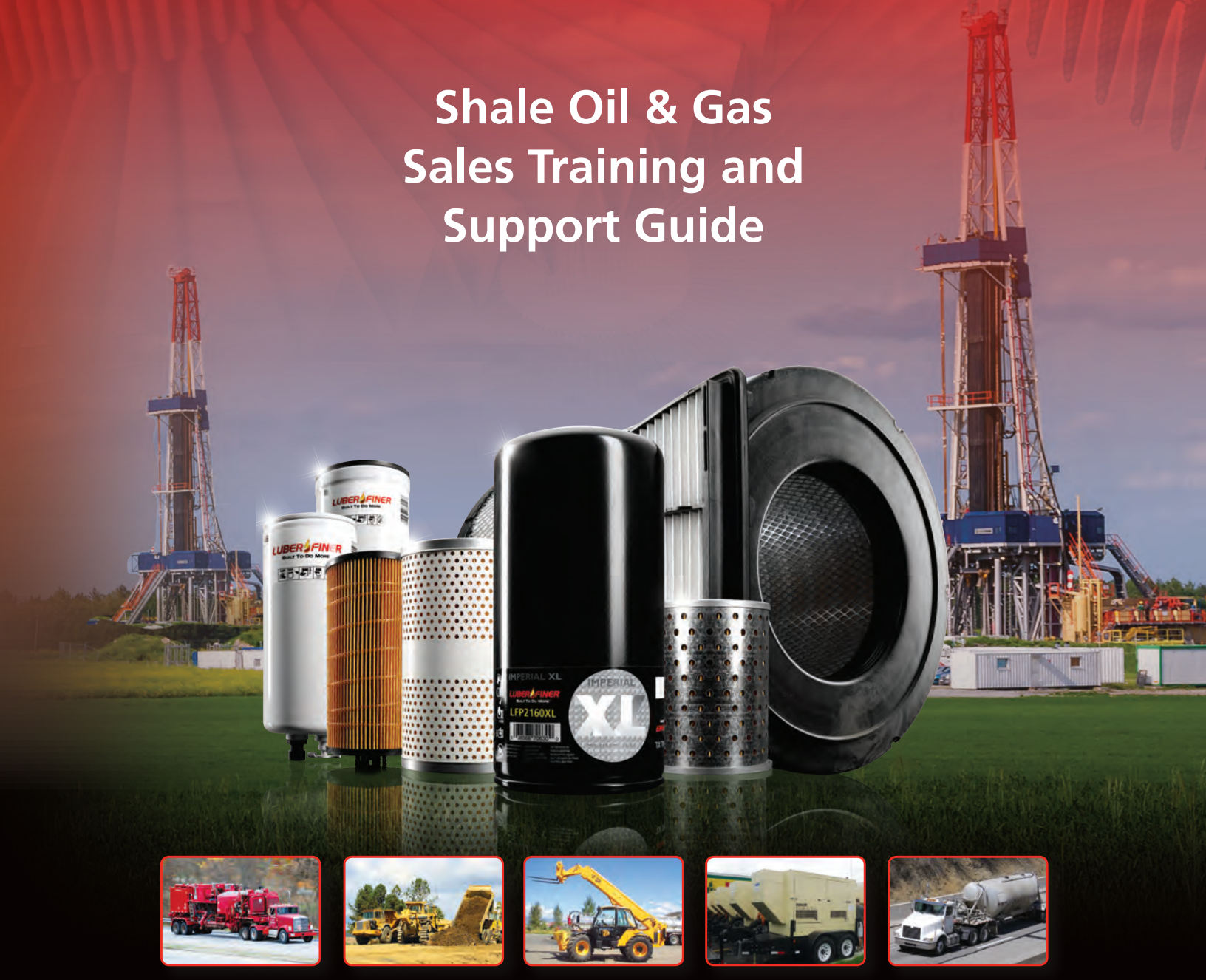
LUBER-FINER®

BUILT TO DO MORE™

Shale Oil & Gas Sales Training and Support Guide



FRAM FILTRATION

Preface

Opportunities abound for the Luber-finer in the vast, and ever-expanding world of North America shale plays! From one end of the continent to the other, the big story is the jump in U.S. oil production, reaching a production output of 6.4 million barrels a day in 2012, and, according to the U.S. Energy Information Administration, projected to reach 7.5 million barrels per day by 2019.

Thanks to oil-rich shale formations and hydraulic fracturing (fracking), the International Energy Agency expects the U.S. to pull even with Saudi Arabia as the world leader in oil production by 2017 and to surpass the Saudis by 2022.

This is exciting news for Luber-finer because upstream oil & gas production requires an enormous amount of heavy-duty equipment in order to first extract this oil and gas and secondly to transport it to refineries and ultimately to the consumer marketplace. This equates into a vast number of filters, or in other words, an enormously exciting opportunity for Luber-finer.

Across the country, energy producers are drilling at a frenetic pace. These operations require vast fleets of heavy-duty equipment to first clear drilling sites, deliver and then power vertical and horizontal drilling rigs, as well as hydraulic fracturing equipment, deliver sand, water, chemicals to the sites, and ultimately to transport produced water and oil away from the sites. The name of the game is "reliable uptime performance"! Reliability, more than robustness, is an important aspect of oil and gas equipment. Equipment MUST perform at optimum capacity 24/7 under extremely harsh conditions. Downtime is unacceptable.

This "black gold rush…and oil boom" has manufacturers of drilling, pumping, processing and heavy-duty equipment running full-tilt.

According to a recent study conducted by the Freedonia Group Inc., global demand for oil-field equipment will rise 4 per-cent annually through 2016 to $109 billion. New techniques to drill for unconventional reserves, such as shale oil and oil sands, will continue to boost spending on oil-field equipment – all of which requires filtration.

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Luber-finer has developed this Shale Oil & Gas Attack-A-Market Kit as a tool to help its sales team and channel partners get up to speed quickly on the Shale play market, the scope of the potential opportunities for Luber-finer products, and the key advantages our products hold in shale oil and gas loading, transfer, transport and unloading applications.

For purposes of this document, it is our opinion that the information included herein offers a reasonably accurate overview of the market landscape as it existed in January 2013. This information is confidential and is intended only for use by authorized Luber-finer personnel as an educational aid. It may be protected by work product immunity or other legal rules.

Introduction

To paraphrase the great American humorist Mark Twain, if recent headlines are to be believed…and all supporting industry data strongly supports their claims, the "rumors of the death of oil production has been greatly exaggerated".

The unquenchable search for new sources of oil and gas continues to produce exciting technological advancements – specifically, Enhanced Oil Recovery innovations that are fueling a modern day oil boom. Today, otherwise heretofore-unreachable petroleum deposits, those trapped in shale are now attainable, ensuring that oil and gas will remain the fossil fuels of choice for many, many years to come.

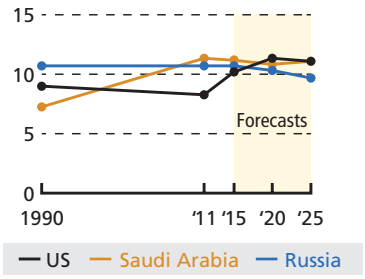
The headlines don't lie:

- "IEA Pegs U.S. as Top Oil Producer by 2020"— *Wall Street Journal*, Nov. 14, 2012: "A shale-oil boom will thrust the U.S. ahead of Saudi Arabia as the world's largest oil producer by 2020, a radical shift that could profoundly transform not just the world's energy supplies but also its geopolitics, the International Energy Agency said. In its closely watched annual *World Energy Outlook*, the IEA…said the global energy map "is being redrawn by the resurgence in oil and gas production in the United States."
- "U.S. monthly crude oil production reaches highest level since 1998"— U.S. Energy Information Administration, Dec. 4, 2012: "U.S. crude oil production averaged almost 6.5 million barrels per day in September 2012, the highest volume in nearly 15 years. The last time the United States produced 6.5 million barrels per day or more of crude oil was in January 1998. Since September 2011, U.S. production has increased by more than 900,000 barrels per day. Most of that increase is due to production…through the use of horizontal drilling combined with hydraulic fracturing. The states with the largest increases (in production) are Texas and North Dakota."

U.S. to Leapfrog Saudis

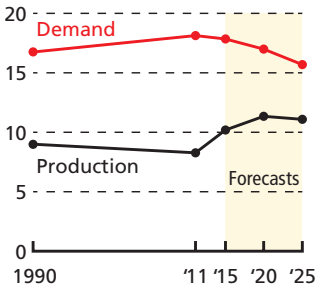
The U.S. is set to overtake Saudi oil output thanks to unconventional reservoirs...

Oil Production
in million barrels a day



...while its oil demand is expected to fall

U.S. Oil Demand vs. Production
in million barrels a day

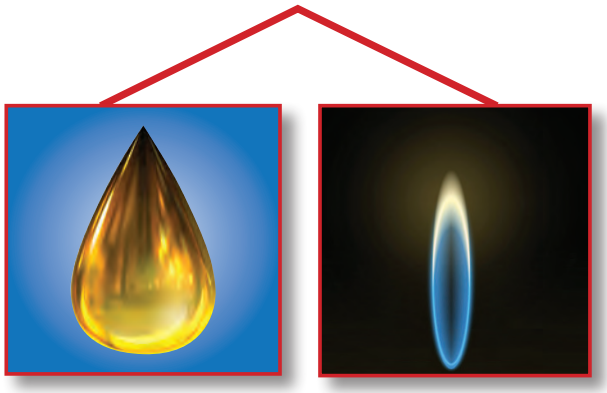


Note: Figures include crude and liquids
Source: International Energy Agency

The Wall Street Journal

WHAT IS SHALE OIL & GAS?

Oil Shale is an organic-rich fine-grained sedimentary rock, containing significant amounts of kerogen



Shale Oil

There's a difference between oil shale and oil produced from shale reservoirs, often called shale oil. Shale oil generates significant, real production growth for North American energy producers and opportunities for Luber-finer.

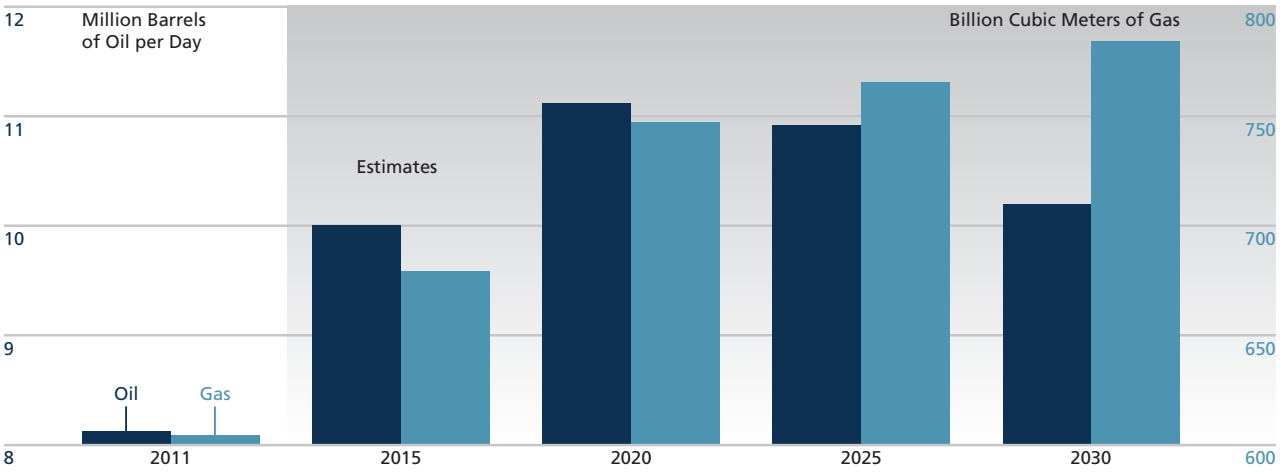
Shale Gas

Shale gas is defined as natural gas from shale formations. The shale acts as both the source and the reservoir for the natural gas. Older shale gas wells were vertical while more recent wells are primarily horizontal and need artificial stimulation, like hydraulic fracturing, to produce.

Source: http://www.api.org

MARKET TRENDS – SHALE OIL & GAS

U.S. to Become Biggest Oil Producer - IEA



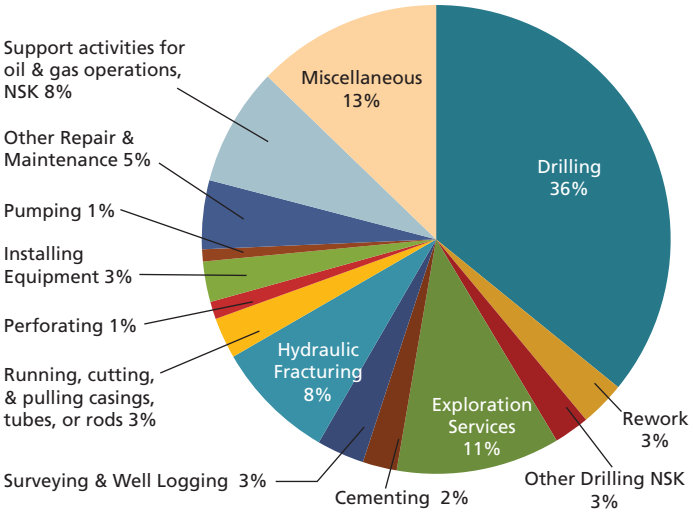
Oil and gas boom puts US on track for energy independence

These headlines—and many, many more—portend a bright future for the Oil & Gas industry in North America, now and well into the future. They also hint at the potential in the ancillary industries that serve Oil & Gas exploration and production, most notably for our purposes, the myriad pieces of heavy-duty equipment that are either in operation at, or travel to and from, production sites that are reliant on various types of filtration products to ensure their dependable operation.

So, while the race to discover and develop forms of alternative energy continues—and any that are economically viable and capable of meeting growing global demand while simultaneously reducing end-user costs should be embraced—Oil & Gas will remain the go-to energy commodities around the globe, with the latest research and actual in-the-field activity pointing to an ever-expanding level of importance for the industry in North America.

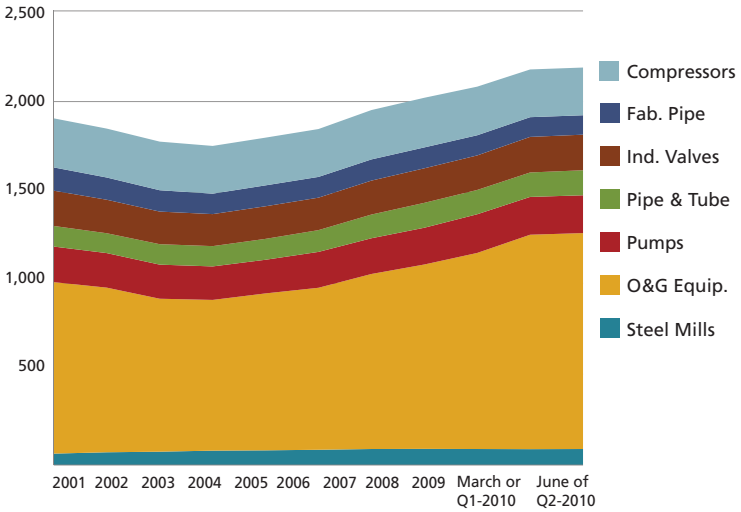
The existing Oil & Gas drilling and production will present innumerable opportunities for Luber-finer. Oil & Gas producers utilize oilfield equipment to open new drilling sites, revisit old ones or maintain current ones. Luber-finer's long history providing the best filtration technologies for equipment that is used in rigorus Oil & Gas exploration, production and transportation will be a beacon for producers who are looking for optimized performance, reliability and cost-effectiveness in their operations.

Figure 5. Breakdown of Exploration & Production Services Revenue in 2007



Source: Compiled from 2007 Census of Business

Figure 9. Establishments in Oil and Gas Equipment Supply Chain



Source: BLS QCEW Employment Series

OIL & GAS MARKET SIZE AND TRENDS

North American Oil & Gas Market

In the November 2012 edition of its Short Term Energy Outlook, the U.S. Energy Information Administration (EIA) reports that domestic crude oil production increased by an estimated 170,000 b/d (3%) to 5.65 million b/d in 2011. The EIA forecasted crude oil production in the U.S. to grow to 6.33 million b/m by the end of 2012 and predicts continued growth to 6.85 million b/d in 2013. Historically, production of crude oil in the U.S. peaked in the early 1970s and then began a steady decline before reaching a 60-year low in late 2008. However, spurred by advances in recovery technologies and unprecedented access to previously unreachable unconventional shale oil plays in North Dakota, Texas, Pennsylvania and Colorado, production began to vigorously rebound and has been growing steadily ever since, reaching 6.5 million b/d in September 2012, the highest level of production since May of 1998.

Regarding natural gas, the EIA reports that U.S. production of natural gas grew by 4.8 billion cubic feet per day (Bcf/d) in 2011, a 7.9% increase from 2010. In 2012, daily production has averaged around 69 Bcf/d, which is a leveling off after sustained daily production growth from 2009-2011, with the EIA estimating that daily production in 2013 will mirror that of 2012.

Historically, we are in the midst of "golden age" of natural gas production in the United States. In January 2012, the EIA reported that nearly 2.6 trillion cubic feet (tcf) of natural gas was produced in the U.S., the highest recorded monthly level in history.

Up north, Canada is one of the world's five largest energy producers and is a net exporter of most energy commodities, a status that is driven by its production of conventional and unconventional sources of oil and natural gas. According to the EIA, Canada produced almost 3.7 million b/d of oil in 2011, an increase of nearly 200,000 b/d from 2010. This total represents a steady rise from the roughly 2.8 million b/d that were produced in 2000.

According to the BP Statistical Review of World Energy 2012, both the U.S. and Canada rank high on the list of countries with the most proven crude oil and natural gas reserves, a positive sign for future exploration and production in North America. Proved reserves are quantities of oil and natural gas which, by analysis of geological and engineering data, can be estimated with a high degree of confidence to be commercially recoverable from a given date forward, from known reservoirs and under current economic conditions.

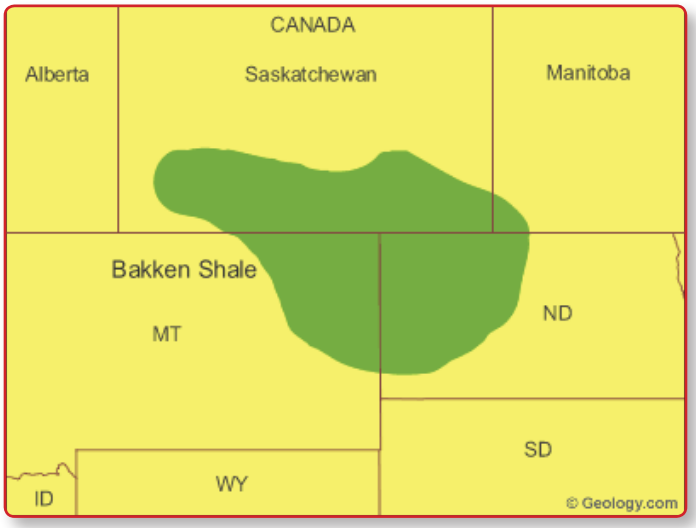
2012 Global Proven Oil Reserves

Country	Oil Reserves (billions of barrels)
Venez Venezuela	296,500,000,000
Saudi Arabia	265,400,000,000
Canada	175,200,000,000
Iran	151,200,000,000
Iraq	143,100,000,000
Kuwait	101,500,000,000
United Arab Emirates	97,800,000,000
Russia	88,200,000,000
Libya	47,100,000,000
Nigeria	37,200,000,000
United States	30,900,000,000
Kazakhstan	30,000,000,000
Qatar	24,700,000,000
Brazil	15,100,000,000
China	14,700,000,000
Angola	13,500,000,000
Algeria	12,200,000,000
Mexico	11,400,000,000
Azerbaijan	7,000,000,000
Norway	6,900,000,000

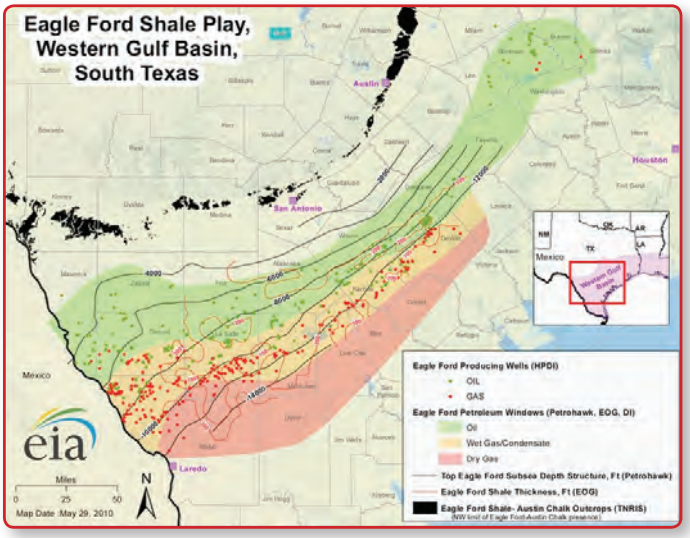
2012 Global Proven Natural Gas Reserves

Country	Natural Gas Reserves (Trillions of barrels)
Russia	44.6
Iran	33.1
Qatar	25.0
Turkmenistan	24.3
United States	8.5
Saudi Arabia	8.2
United Arab Emirates	6.1
Venezuela	5.5
Nigeria	5.1
Algeria	4.5
Australia	3.8
Iraq	3.6
China	3.1
Indonesia	3.0
Malaysia	2.4
Egypt	2.2
Norway	2.1
Canada	2.0
Kazakhstan	1.9
Kuwait	1.8

1. **Bakken Shale**
The Bakken oilfield is located in the Williston Basin in North Dakota, Montana and into Canada. The Bakken has been called the "largest oil discovery in the U.S. next to the oil fields in Alaska" by the U.S. Geological Survey (USGS), with some sources saying up to 24 billion barrels of proven reserves could be located in the play. For comparison, the Arctic National Wildlife Refuge in Alaska could potentially produce up to 10 billion barrels of oil.



2. **Eagle Ford Shale**
Eagle Ford is located in southern Texas, with oil predominant in the northern half of the play and natural and natural gas liquids (NGLs) found more often in the southern areas. Proven reserves in the Eagle Ford Shale have been pegged at more than 10 billion barrels.

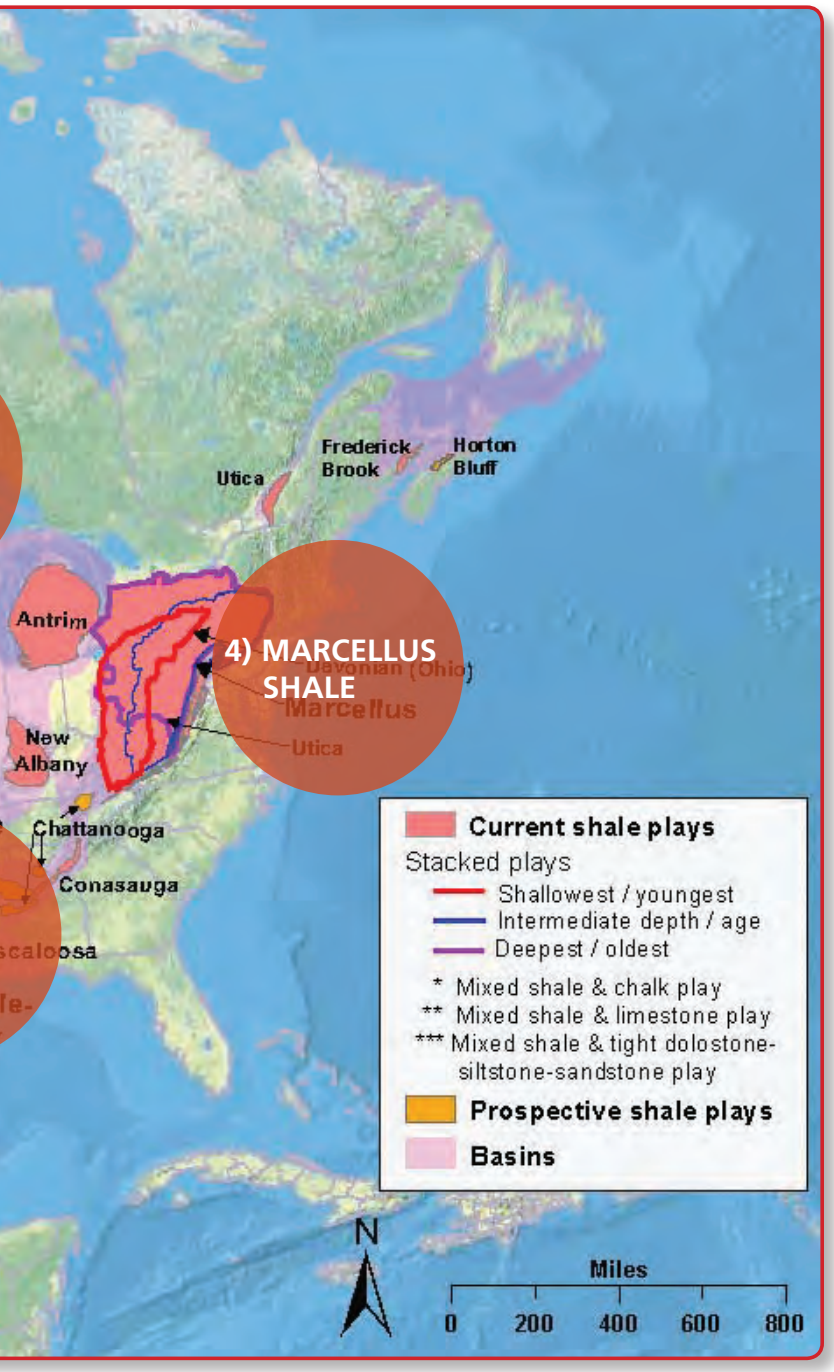


LOWER 48 STATES SHALE OIL & GAS PLAYS

Source: U.S. Energy Information Administration, based on data from various published studies. Canada and Mexico plays from ARI. Updated: May 9, 2011

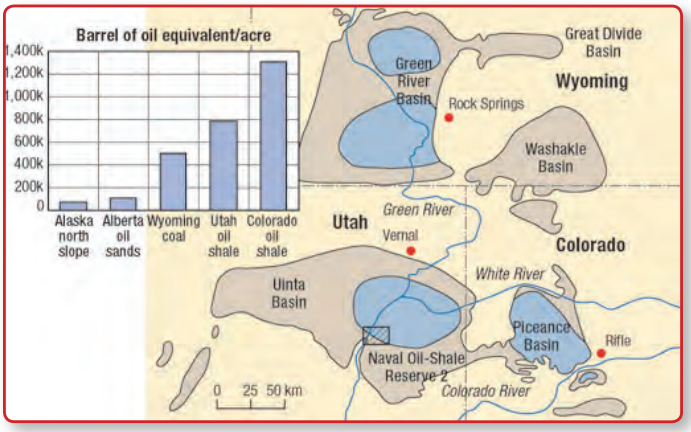
Unconventional North American Oil & Gas Market

United States Shale Oil & Gas The United States' growing prominence in the global Oil & Gas market is being driven by so-called "unconventional" deposits. Specifically, the presence of vast shale oil and gas reserves in the U.S., along with advances in technologies such as horizontal drilling and

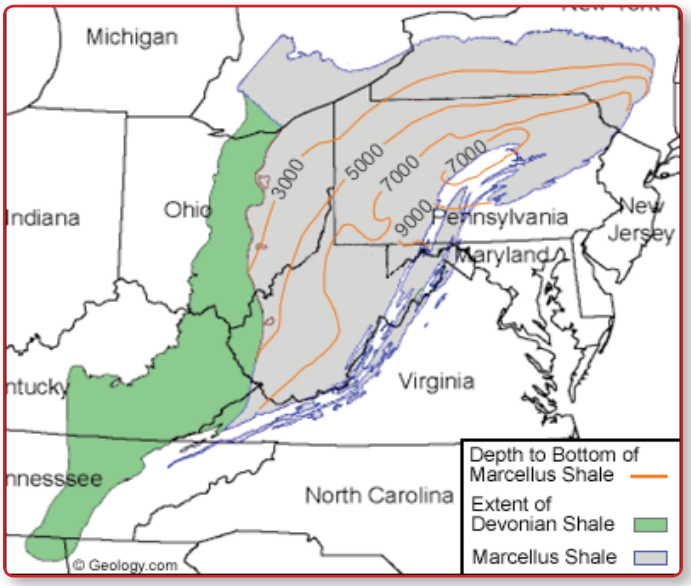


hydraulic fracturing that make recovery more economically feasible, are helping optimize production levels and providing proven reserves that promise to make the U.S. a major player in the global Oil & Gas market for many decades to come.

3. **Green River Formation**
Spread across Colorado, Wyoming and Utah, the Green River Formation is said to be the largest shale deposit in the U.S., with an estimated 1.3 to 2 trillion barrels in proven oil reserves, with around 750 billion barrels considered to be recoverable, which is three times more than the total oil reserves of Saudi Arabia.

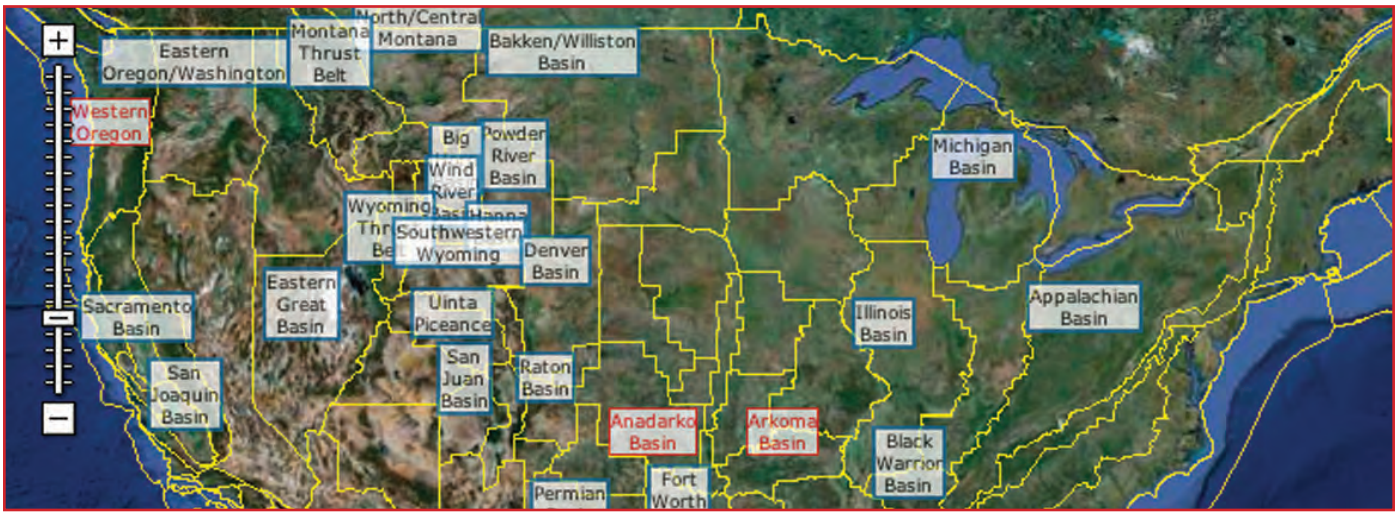


4. **Marcellus Shale**
The Marcellus Shale is a natural gas formation that stretches nearly 600 miles and covers 95,000 square miles through Pennsylvania, New York, Ohio and West Virginia. Some estimates put the amount of natural gas in the Marcellus Shale at upwards of 500 trillion cubic meters, with about 50 tcf recoverable given current available exploration and production technologies.



MARKET OVERVIEW – WHERE IS ALL THIS SHALE OIL & GAS?

For Alberta to Wyoming, and all points in between, the United States and Canada are blessed with shale reserves. Below is a list of the most prominent shale oil and gas plays. The advent and continuing improvement of advanced crude oil production technologies continue to lift projected domestic supply calculations. New "discoveries" will continue to emerge, for example, such as the Cline Shale play in Texas – considered by oil and gas experts to be the hottest new shale play in the United States – and one that will rival even the prosperous Eagle Ford region.



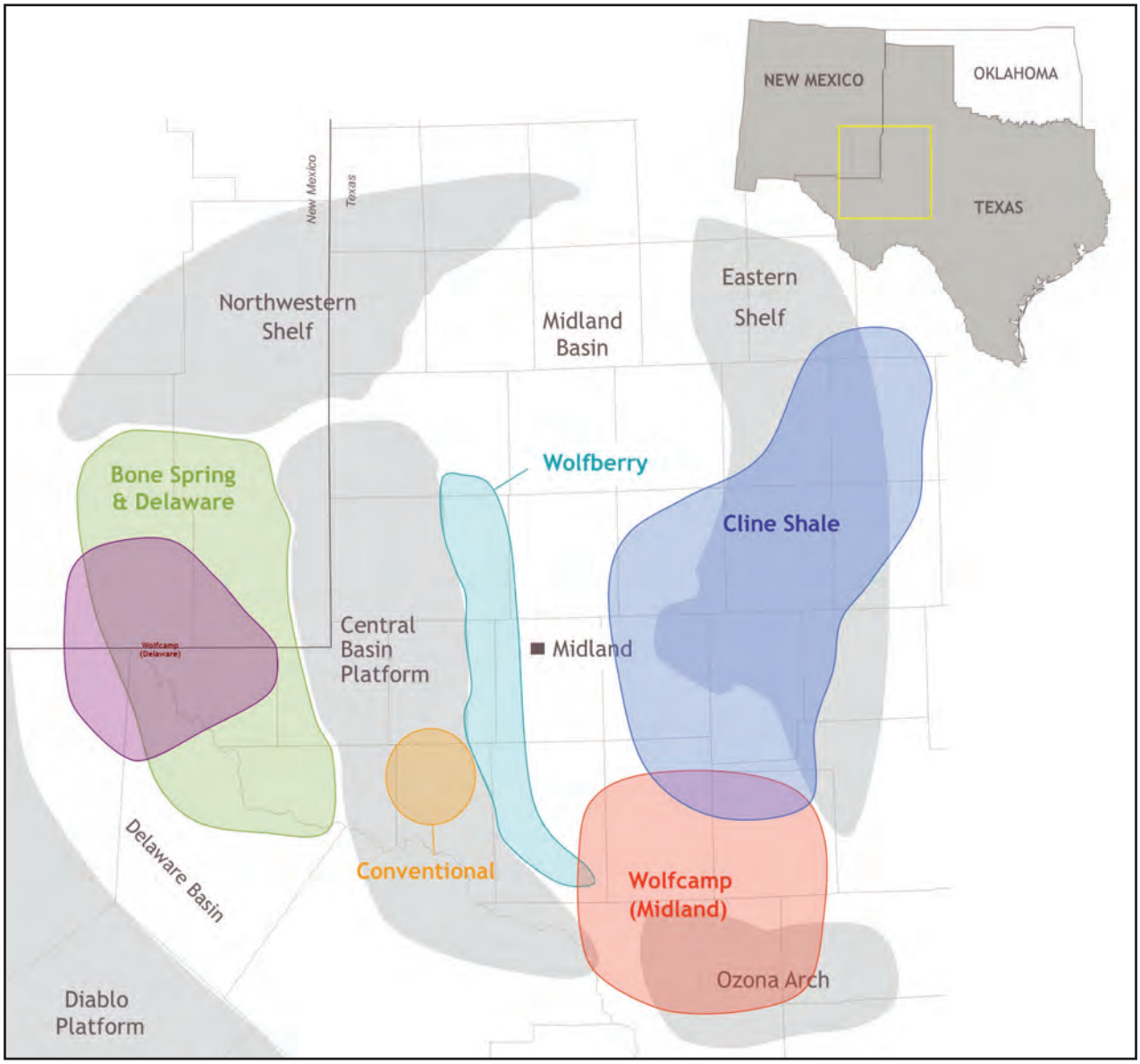
U.S. State	Shale Oil & Gas Plays
Alabama	Alabama Shale Fields
Alaska	Anwar
Arkansas	Fayetteville Shale
California	Los Angeles Oil Field - Wilmington Basin
	Kern County Oil Field
	Monterey Shale
Colorado	Green River Oil Shale
	Niobrara Shale
	Piceance Basin
Kansas	Niobrara Shale
Kentucky	Huron Shale
Louisiana	Austin Chalk
	Bossier Shale
	Haynesville Shale
Michigan	Antrim Shale
	Collingwood Shale
Montana	Bakken Shale
	Exshaw Shale
	Three Forks / Sanish Zone
Nevada	Chainman Shale
New Mexico	Avalon Shale

U.S. State	Shale Oil & Gas Plays
	Bone Spring
	Permian Basin
	Wolfcamp Shale
New York	Marcellus Shale
North Carolina	Cumnock Shale
North Dakota	Bakken Shale
	Three Forks / Sanish Zone
Ohio	Huron Shale
Oklahoma	Granite Wash
	Hogshooter Wash
	Woodford Shale
Pennsylvania	Marcellus Shale
Tennessee	Chattanooga Shale
Texas	Austin Chalk
	Barnett Shale
	Bone Spring & Delaware
	Bossier Shale
	Cline Shale
	Eagle Ford
	Granite Wash
	Haynesville Shale
	Permian Basin
	Spraberry Field

U.S. State	Shale Oil & Gas Plays
	Wolfberry Field
	Wolfcamp Shale
Utah	Green River Oil Shale
	Chainman Shale
West Virginia	Marcellus Shale
	Huron Shale
Wyoming	Green River Oil Shale
	Niobrara Shale

Canadian Province	Shale Oil Field
Alberta	Alberta Oil Fields
	Cardium Shale
	Exshaw Formation
	Montney Shale
British Columbia	Cardium Shale
	Exshaw Formation
	Horn River Shale
	Montney Shale

NEW DISCOVERIES OF SHALE OIL & GAS PLAYS CONTINUE TO FUEL THE DEMAND FOR MORE HEAVY DUTY EQUIPMENT



The hottest new shale play can be found in the Permian Basin – the Cline Shale – it could be the largest oil play in U.S. history.

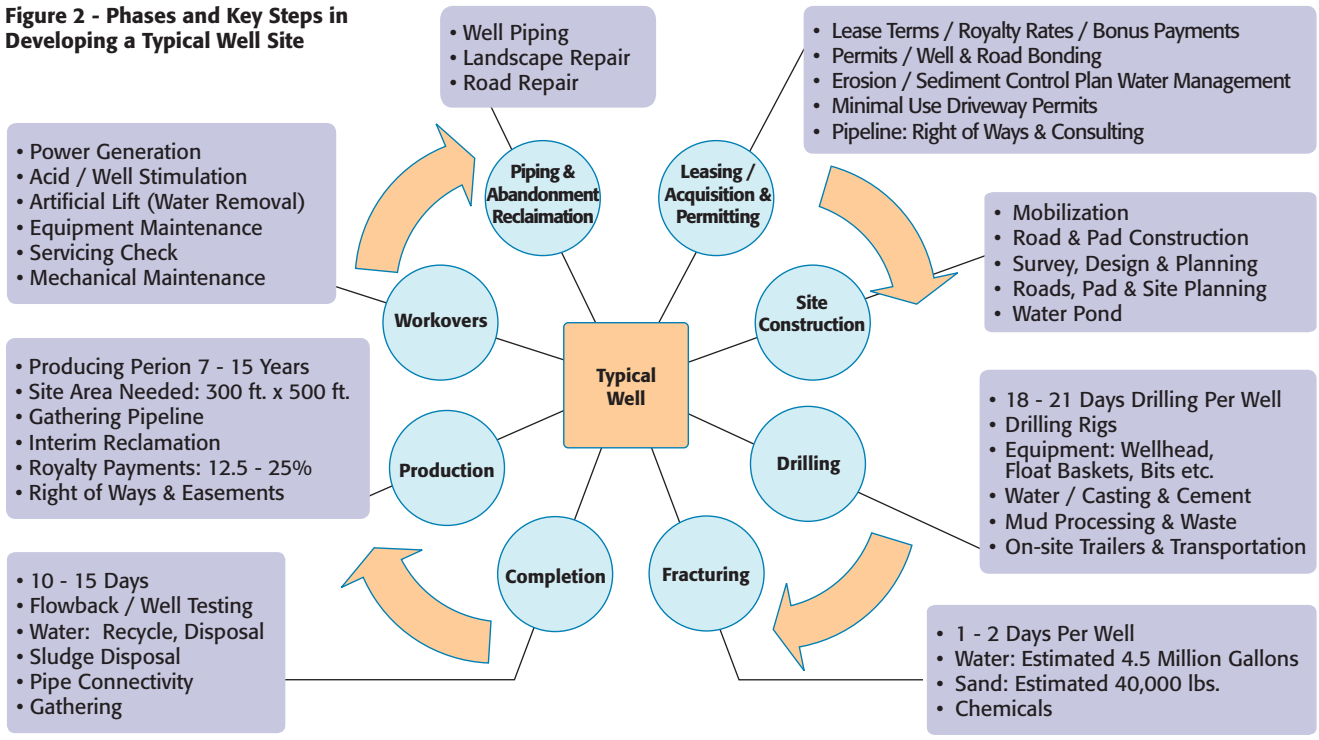
According to a December 2012 article in PB Oil & Gas Magazine – "the emerging Cline Shale has become the hottest oil shale target, sparking comparisons to the Bakken Shale in South Dakota, the Eagle Ford Shale in south texas, the Mississippi Lime play in Oklahoma and Kansas, the Granite Wash in the Texas panhandle and western Oklahoma, and the Wolfcamp and Bone Spring in the Permian Basin. More than one oil and gas publication called the Cline Shale one of the hottest new shale plays in the United States."

Map courtesy of Devon Energy

So – what is the Cline Shale?

- A deep zone formation – about 6,000 to 9,000 feet down – equivalent to ten (10) Eagle Ford Shales stacked on top one another
- Lies about 35 miles from Midland, Texas where vertical wellbores have previously extended into the Wolfcamp and the other deep zones
- 140 miles long and 70 miles wide
- Projected to contain 3.6 million barrels of recoverable oil per square mile – about 30 billion barrels for the entire shale
- Expected production: 570,000 barrels of oil equivalent per day

Figure 2 - Phases and Key Steps in Developing a Typical Well Site



Phases and Key Steps in Developing a Typical Shale Well Site

The process of extracting oil and gas from the earth follows a very defined pathway. It is important to understand the key phases and processes, as there is no single company that handles the entire process as a turnkey operation. The charts on the following pages will help you to better understand the overall picture, each phase of the process and the key buying influences relative to acquisition and ongoing maintenance of the heavy-duty equipment. A typical six-well drilling site will take about 108 days to complete. In that timeframe, anywhere from 100 to 120 pieces of heavy-duty equipment, making thousands of trips to and from the wellhead will be deployed. With as many as 18,600 wells in operation in North America in 2012 alone, this represents a lot of heavy-duty filters!

Exploration

The exploration process begins when an oil company decides to evaluate a particular area or region for oil and gas, and continues until a decision is made to develop a particular field.

Prior to Leasing

The exploration process begins long before a well is ever drilled. Geologists and geophysicists study the subsurface characteristics of areas and regions using publicly available data combined with some proprietary data in the possession of or ordered by the oil company. Large trucks move along the surface and produce shock waves that bounce off rock formations below the surface of the earth.

Mineral Leasing / Acquisition and Permitting

Once particular prospects are identified, the oil companies will negotiate a contract or lease for the rights to drill to compensate the mineral owners. Lease terms vary, but generally include a "bonus" or one time payment, calculated per acre, for the right to drill over a specific period of time. A specified royalty interest is negotiated for the owner of the mineral rights of the land, along with the rights to build roads and pipelines, and the lease can contain stipulations or mitigation measures pertinent to protect the environment. The oil company's staff "landmen" with the legal and contracts management staff handles this portion of exploration.

Permitting

Once the property is leased, the oil company – now called the "operator" as described in the lease - must obtain a permit from the state regulatory body to authorize drilling a new well.

When a company files for a drilling permit it becomes public record. Tracking drilling permits enables you to know where drilling activity is going to be happening in the future. By following this activity, you can identify in advance the potential drilling operators and well services companies who will be hired to extract the oil in these regions. These are the companies in possession of the heavy-duty equipment that will be used for the drilling, fracturing and transportation on these projects.

Site Preparation

After the Permits are obtained, the drilling site must be prepared and the drilling contractor is hired.
The two primary parties in drilling a well are the Operator and the Drilling Contractor that they hire to drill the well. Each party has significant responsibilities for supplying the operation.

Operator: is responsible for:

- The well and the environmental condition of the site
- Contracts for all services and materials not associated with the rig, such as drilling mud, rental pipe, cement and cementing services, evaluation tools and services, and logistics
- Because intangible drilling costs can be used as a tax credit on the Operator's Federal tax return, there is a strong motivation to rent as much equipment and services as possible.
- Intangibles comprise about 80% of total drilling costs. The Operator will purchase the tangible equipment (casing, valves, etc.) that will become part of the well. The set of companies that supply rental equipment and services are known collectively in the industry as "service companies."

Drilling Contractor: is responsible for:

- The rig and its crew
- Contracts for all rig-associated services, including maintenance mechanics and electricians, food, and first aid for crew.
- If a piece of equipment associated with the rig (motors that power the drilling process, crane, etc.) breaks down during drilling, the Drilling Contractor is responsible and will purchase or rent the tools, parts and personnel needed for repairs and maintenance.
- Drilling Contractors that are

Site Construction - Conductor / Construction Phase

- Includes heavy-duty earth-moving equipment for the construction of access roads, grading of the site, installation of the well pad, placement of on-site trailers, construction of water storage or pits and erosion control from which the drilling is done and other associated equipment is located as well.
- Once the drilling site is cleared, the construction crew drives 20" pipe into the ground to a depth of 40-200 feet, or until competent bedrock is reached. A typical drill site will have six (6) of these so-called "conductor" holes drilled at 15-foot intervals. It typically takes 2-10 days to prepare a site, and three days for each of the six conductor holes to be drilled.

Drilling

The drilling phase requires myriad pieces of heavy-duty equipment to support drilling rigs, power generators, processing and disposal of liquids and solid waste.

Tophole Drilling Phase

Once the wellpad has been built and conductors set, a tophole rig is moved in. This rig pounds the ground with a pneumatic air hammer so that a string of 13-3/8-inch surface casing (300-500 feet in length) and 9-5/8-inch intermediate casing (up to 2,000 feet in length) can be set in the well. In addition to the big trucks that hail the rig itself, this operation also requires heavy-duty skid mounted air compressors, a telehandler, wheel loader with bucket, excavator, two (2) forced-air heaters, a Glycol heating unit, six (6) 4-kilowatt light towers, two (2) 80-kilowatt generators, and transport trucks – all of which are powered by diesel engines that require filters. This phase may take two (2) days per well hole or a total of twelve (12) days for a six-hole well.

Horizontal Drilling Phase

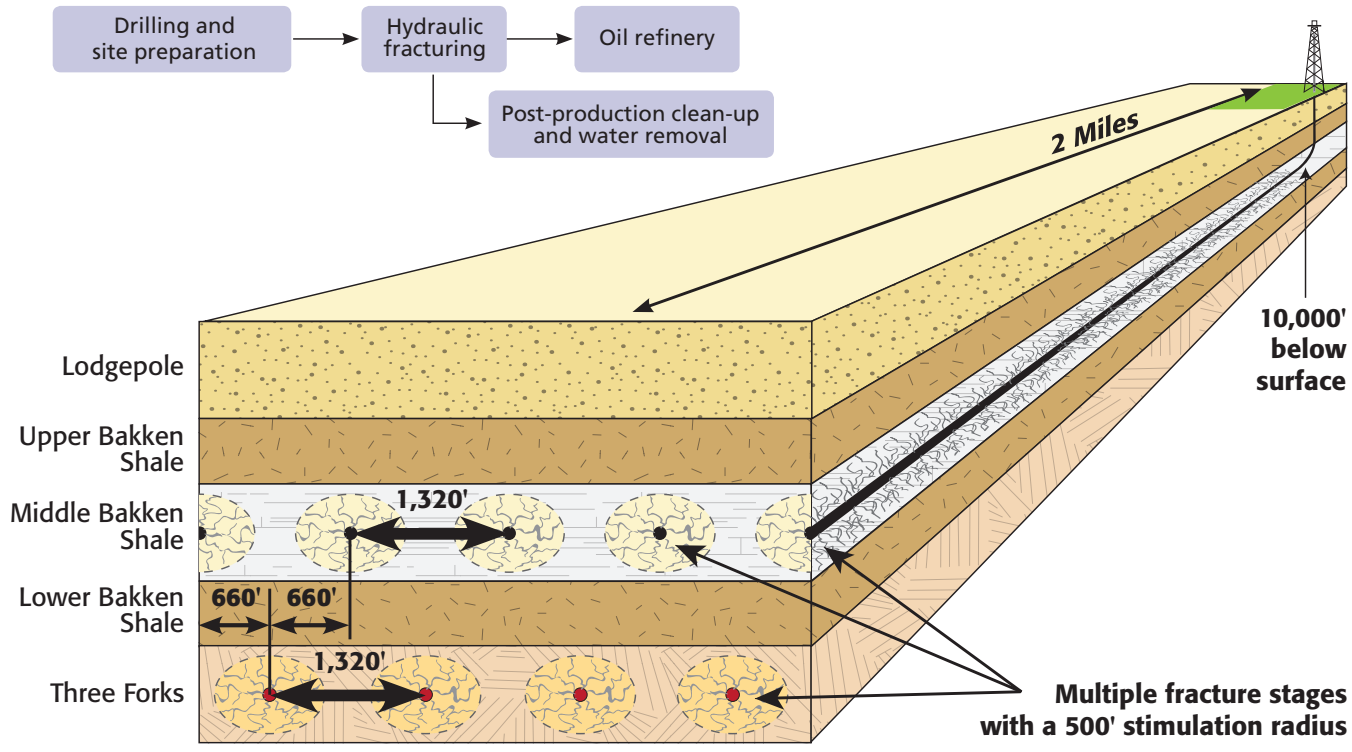
Once the "vertical" tophole drilling is completed, a "horizontal" rig is brought in to continue the drilling process from the tophole termination point (approximately around 2,000 feet). The horizontal rig will continue drilling to a level of approximately 4,500 and 6,500 feet before making the slow arcing turn to a horizontal drilling orientation. At this point, 5-1/2-inch casing is run the entire length of the well bore – from the surface to the end of the drilling point.

This portion of the process requires a large number of diesel-powered engines and compressors to operate equipment, such as: drawworks, top drives, cat walks, mud pumps, centrifuges and shakers, loaders, excavators, telehandlers, and pumps for fluid transfer. This phase may take 12-14 days per well hole, or between 72 to 84 days total.

HYDRAULIC FRACTURING

Once the horizontal rig completes its work, the "frack crew" moves in. An impressive army of heavy-duty "fracking" rigs is required to perform the fracturing operation. A fracking solution (consisting of 98% water + sand and chemical additives) is injected into a well under high pressure by these massive trailer mounted machines. Water along with additives fracture the shale rock, while sand props open the fractures, allowing the oil and natural gas to flow. The fracking rigs are typically owned, operated and maintained by the Oil Field & Drilling Services companies. The Operator is ultimately responsible for the environmental condition of the well site and typically contracts with water recycling and disposal companies – each of which possess and maintain fleets of tanker trucks for this purpose. An average six-well fracking and recovery operation will take approximately 30 days to complete.

Major Process Steps in Horizontal Drilling and Hydraulic Fracturing



26 http://www.investingdaily.com/tes/16405/oil-shale-versus-shale-oil.html

SIMPLIFIED STEPS IN HYDRAULIC FRACTURING

1. The horizontal section of the well uses a tube inserted through the well casing that carries explosive charges to perforate the shale at intervals about 50 to 80 feet apart.
2. The tube is pulled to the surface. Water, sand and additives are pumped at extremely high pressures down the wellbore into the horizontal casing.
3. The liquid goes through perforated sections of the wellbore and into the surrounding formation. Pressure builds until the shale formation fractures the rock, injecting proppants – sand or ceramic pellets – into the cracks to hold them open.
4. Experts continually monitor and gauge pressures, fluids and proppants, studying how the sand reacts when it hits the bottom of the wellbore, slowly increasing the density of sand to water as the frack progresses.
5. Fleet of trucks, most pumping the water mixture down the hole, deliver up to 45,000 pounds of sand each.
6. This process may be repeated multiple times, in "stages," to reach maximum areas of the wellbore.
7. Some wells get fracked as many as 20 times and can last for as many as five days or more. When this is done, the wellbore is temporarily plugged between each stage to maintain the highest water pressure possible and get maximum fracturing results in the rock.
8. The frack plugs are drilled or removed from the wellbore and the well is tested for results.
9. The water pressure is reduced and fluids are returned up the wellbore for disposal or treatment and re-use, leaving the sand in place to prop open the cracks and allow the gas to flow.
10. When the fracking process has been completed, the pumping trucks go away. A network of valves is installed at the wellhead to regulate the well's flow. The oil and gas then goes to storage tanks or a pipeline and on to a refinery or processing plant.

Completion

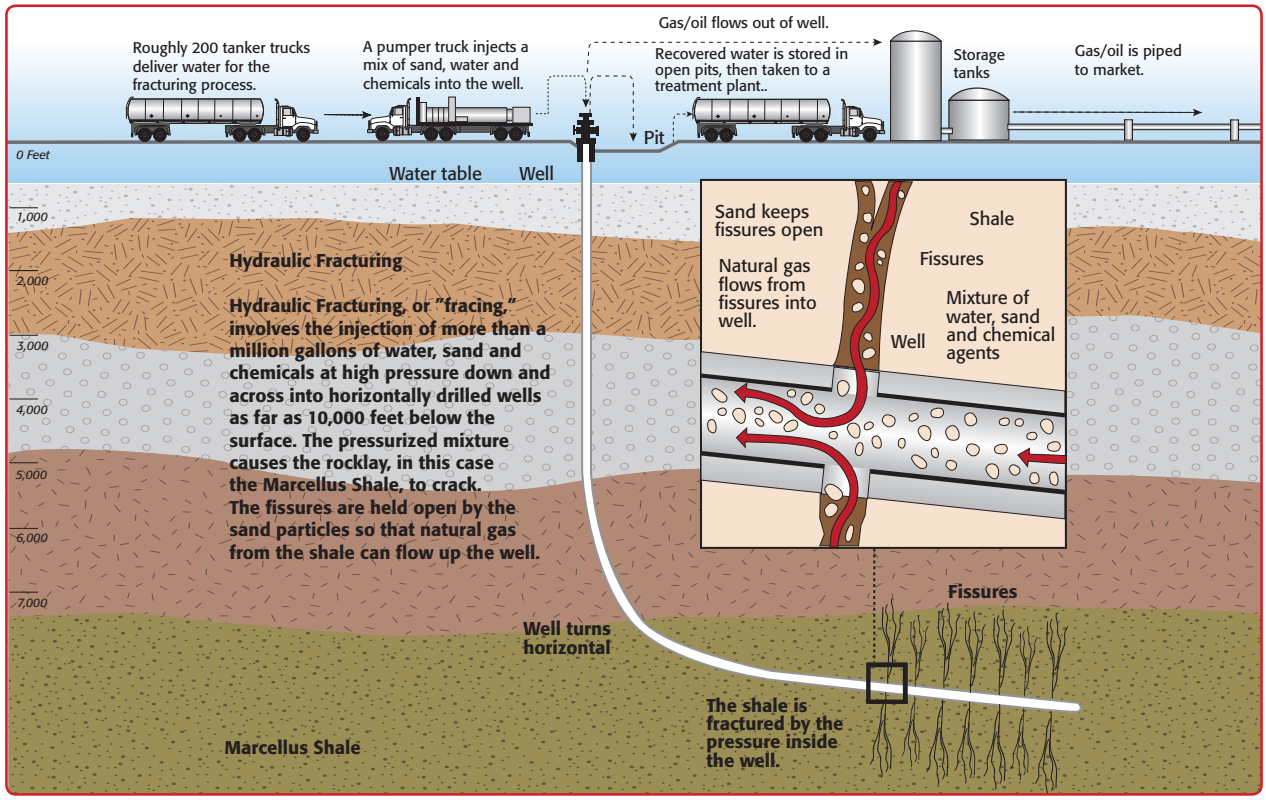
At this point the wells are "completed" meaning that the final equipment needed for the wells to produce is installed, including oil field pumping units and/or the "Christmas tree" – a large set of valves on top of the well.

Production

The production stage covers the gathering systems and pipelines. This stage also includes the finishing off the pad area (typically 300 x 500ft), the gathering pipeline and interim reclamation, erosion control systems and landscape and road repair – all of which requires heavy-duty equipment owned by local construction and service companies that specialize in this oil field work.

Workovers

After the well has been producing for a while, certain procedures are needed to maintain the equipment inside the well, evaluate the reservoir performance over time, and stimulate production. Hydraulic fracturing, when done after the well has been producing for a while, is one type of workover, done repeatedly on a shale gas well over its life.



MIDSTREAM OIL & GAS SEGMENT

Midstream services consist of transportation, storage and marketing of products. Pipelines are the principal transportation mode for domestic production, although in remote regions, such as in shale or oil sands regions, rail and tanker trucks are the preferred (and required) methods of transportation.

Due to the rapid emergence of the industry and lack of available pipelines, 75% of shale oil production is trucked from the pad*.

TANK TRUCK TRANSPORTS

Liquid Transports - 75% of oil production is trucked from the pad*

On both sides of the wellhead, liquid transport trucks are in high demand. At the present time, almost all wellhead completion fluids, such as chemicals and water, are being moved to the site via truck. The same holds true for shale oil and condensate production being moved from the wellhead. With some wells making over 1,000 barrels a day, and with the capacity of a crude transport truck at around 200 barrels, this can result in several loads per day from a field. Shale crude bottlenecks are developing almost everywhere. According to producers, there is a shortage of trucks to transport oil from the plays. Trucks are used to move various liquids to and from the wellhead, including but not limited to:

- Completion Fluids (various chemicals and gels to be mixed with frac sand)
- Potable water
- Wastewater (salty, brine water/produced/contaminated water for treatment)
- Diesel fuel

Virtually every oil and gas well produces some amount of wastewater, along with the petroleum that flows out of it. This wastewater is usually salty or "brine water." Brine water must be hauled away from open pits and tanks to a disposal facility by vacuum trucks.

These trucks have heavy duty pumps that suck up hundreds of barrels of brine water and haul it away to a disposal facility. Many companies that offer vacuum truck services also have hot oil trucks and equipment. In addition to the crude oil tankers, hot oil truck drivers work with equipment that uses heated oil to treat wells clogged with paraffin and other solids.

Dry Bulk – Pneumatic Transports

Dry bulk, pneumatic trailers for hauling frac sand are also in high demand. Frac sand haulers carry up to 25 tons of frac sand and supply sand on-site to the blending units. Once frac sand operations begin at a wellhead, it cannot stop. Multiple trucks line up and unload rapidly to hoppers, called sand chiefs, which feed the frac blending machine.

Chemical Transports

Chemical transports deliver frac completion fluids to the site and convert the vessel to on-site chemical trailers. Alternatively, totes are delivered on flat bed trucks so that chemicals can be mixed during fracking processes.

Throughout the oil & gas upstream and midstream operations, fleets of heavy-duty trucks are required to move the oil, sand, water and chemicals. Luber-finer has the filter coverage for virtually any and all of these vehicles.




THE CHEMISTRY OF HYDRAULIC FRACTURING

In addition to water and sand, which comprises 98% of the volumes in a hydraulic fracturing operation, chemical additives are used to allow hydraulic fracturing to be performed in a safe and effective manner. Chemical additives used in hydraulic fracturing fluids include a number of chemical compounds found in common consumer products.

A representation showing the percent by volume of typical deep shale well hydraulic fracturing fluid components reveals that nearly all of the hydraulic fracturing fluid is comprised of freshwater and sand.

This fluid is injected into deep shale formations and is typically confined to the limited injection area by many thousands of feet of impervious rock layers.

The water brought in is mixed with sand and chemicals to create fracking fluid. **Approximately 40,000 gallons of chemicals are used per fracturing.**

It takes **1.8 million gallons of water** to complete each fracturing job.

Each gas well requires an average of **400 tanker trucks** to carry water and supplies to and from the site.

FRACTURE SANDS – A KEY INGREDIENT IN FUELING THE OIL BOOM

Fracture sand (commonly referred to as frac sand) is a key ingredient in the hydraulic fracturing process. This special sand is used to hold open fractured shale without plugging to allow gas and liquid to escape and be collected at the surface.

Frac sand is found mostly in four states: MI, WI, TX, and LA. Today, frac sand sells for about $75 to $100 per ton (versus $10 per ton for construction quality sand).

There are two key ways frac sand is being shipped:

1. In most cases – it is loaded on to railcars at the sand pit and moved by rail close to a drilling site, then trucked out to the well sites.

2. Trucks are loaded at the sand mine and transport either directly to the well site or to a transloading hub – where the sand is moved by rail, then back to a truck for the final delivery to the well site.

Local sand truck fleets haul the sand from depots to frac sites.

Between 80 to 150 loads of sand are required for each fracking operation, and as much as 600,000 and 800,000 pounds of frac sand are typically stored on site at fracking wells. In Wisconsin alone, it is projected that 9,000 truckloads of sand per day will be shipped to fracking sites.

In a report released by *trailer-builders.com*, a common theme from pneumatic frac truck trailer builders is an increased output between 15-30%.

TYPICAL FRACTURING PROCESS WELL SITE EQUIPMENT OVERVIEW

Well Site Preparation – Access Road Construction

Overview

Newly constructed access roads are typically unpaved and are generally 20-40 feet wide providing access to the well pad.

Typically, this is a local engineering & construction company specializing in this type of work.

Construction Equipment	Quantity
Excavator	2
Grader	2
Bulldozer	2
Compactor	2
Water Truck	2
Dump Truck	2
Loader	1

Well Site Preparation – Well Pad Preparation

Overview

Prior to the installation of a well, the site must be cleared and graded to make room for the necessary drilling equipment.

Typically, this is a local engineering & construction company specializing in this type of work.

Construction Equipment	Quantity
Excavator	1
Bulldozer	1
Water Truck	1
Dump Truck	2
Pick Up Truck	2

Vertical Well Drilling (Rotary Air)

Overview

Once initiated, the drilling operation continues 24 hours a day until completion.

This stage precedes the horizontal drilling phase.

Construction Equipment	Quantity
Drill Rig Drive Engine	1
Compressors	4
Hurricane Booster	3
Compressor Exhaust	1
Mud Pumps	2
Transport Trucks	20
Rig Transport	1
Bucket Loader	1
Telehandler	1
Light Trucks	5
Service Trucks	2
Power Gen (lighting)	6

How Many Truckloads does it take to bring a single well into production?

The answer: 1,012*…and, that's just one way:

- 270 truckloads of gravel (to build the well pad)
- 80 truckloads of sand
- 400 truckloads of fresh water
- 200 truckloads of waste water
- 100 truckloads of Frac tanks
- 50 truckloads of rig equipment
- 50 truckloads of drilling mud
- 4 truckloads of chemicals
- 15 truckloads of cement
- 10 truckloads of pipe
- 80 truckloads of scoria/graveal
- 7 truckloads of fuel
- 15 truckloads of Frac/Cement pumper truck
- 1 truckload – work-over rigs

*SOURCE: http://synergystation.com/infrastructure/transportation/bakken-oil-field-truck-traffic-taxes-community-infrastructure/

There are many factors to consider in determining an estimated range, because there can be an enormous difference in water usage between one drill pad and another, but here are some interesting statistics:

- Gallons of fresh water per well: 2 to 9 million
- Truck trips per well fracking: 320 truck trips for a 2 million gallon fracking or 1,440 truck trips for a 9 million gallon fracking operation (For a single horizontal well fracturing, requiring 5 million gallons of fresh water, expect 100 large freshwater-hauler loads of driving to the well during fracture. Then, another 700 smaller waste-hauler truckloads to transport waste away to a disposal facility. That's 800 trucks with a gross weight of up to 40 tons.
  - 800 trucks divided by 5million gallons = 160 truckloads per million gallons
  - 100 divided by 5 = 20 large freshwater hauling trucks per million gallons fresh water used.
  - 700 divided by 5 = 140 smaller waste hauling trucks per million gallons of fresh water used.

TYPICAL FRACTURING PROCESS WELL SITE EQUIPMENT OVERVIEW

Horizontal Well Drilling	
Overview	
Once initiated, the drilling operation continues 24 hours a day until completion.	
Construction Equipment	Quantity
Rig Drive Motor	1
Generator	3
Top Drive	1
Draw Works	1
Triple Shaker	1
Mud Pumps	2
Transport Trucks	20
Rig Transport	1
Bucket Loader	1
Telehandler	1
Light Trucks	5
Service Trucks	2
Power Gen (lighting)	6
Catwalk	1
Compressors	2

High-Volume HydraulicFracturing		
Overview	**Construction Equipment**	**Quantity**
During the fracturing process, water, sand and other additives are pumped under high pressure into the formation to create fractures. Up to 20 diesel-pumper trucks operating simultaneously are necessary. Similar to the other aspects of the drilling process, fracturing sites require the use of support equipment and vehicles. Well Stimulation & Intervention System OEMs build the fracturing equipment. Oil Field Drilling & Services Companies own, operate and maintain this equipment, sometime with the support of preventative maintenance services providers.	Pumper Truck o 12V4000 o 16V4000	20
	Blenders	2
	Chemical Additive	2
	Data Acquisition & Control	1
	Acidizing Unit	2
	Proppant (Sand) Trucks	2
	Fresh Water Trucks	2
	Waste Water Removal	4
	Drilling Fluids Trucks	2
	Pick Up Trucks	5
	Refueling Truck	1
	Draw Works	1
	Transport Trucks	20
	Service Trucks	2
	Power Gen (Lighting)	6
	Telehandler	1
	Bucket Loader	1

No matter how you slice it, oil and gas drilling and production requires a staggering amount of heavy-duty fleet equipment, all of which needs to be maintained in tip top condition. Preventative maintenance is key to the equipment enduring the harsh conditions and high-reliability demands placed upon it by oil and gas drilling and fracking operations. The best equipment in these types of operating conditions is that which delivers maximum Mean Time Between Repairs (MTBR). Further, immediate availability of parts is critical since downtime out here can result in significant revenue loss.

Most of the heavy-duty equipment in the oil field runs on power units that require superior fluid and air filtration to ensure maximum uptime performance even though the dust, dirt, grime and the extended operating cycles place brutal demand on the equipment. In this environment, choosing the best possible filter is a small price to pay to ensure reliable heavy-duty performance.

TYPICAL FRACTURING PROCESS WELL SITE EQUIPMENT OVERVIEW (CONTINUED)

Estimated Number of One-Way (Loaded) Trips Per Well: Horizontal Well1 (New August 2011)

Well Pad Activity	Early Well Pad Development (all water transported by truck)		Peak Well Pad Development (pipelines may be used for some water transport)	
	Heavy Truck	Light Truck	Heavy Truck	Light Truck
Drill pad construction	45	90	45	90
Rig mobilization2	95	140	95	140
Drilling fluids	45		45	
Non-rig drilling equipment	45		45	
Drilling (rig crew, etc.)	50	140	50	140
Completion chemicals	20	326	20	326
Completion equipment	5		5	
Hydraulic fracturing equipment (trucks and tanks)	175		175	
Hydraulic fracturing water hauling3	500		60	
Hydraulic fracturing sand	23		23	
Produced water disposal	100		17	
Final pad prep	45	50	45	50
Miscellaneous	-	85	-	85
Total One-Way, Loaded Trips Per Well	1,148	831	625	831

Source: All Consulting 2010.

1. Estimates are based on the assumption that a new well pad would be developed for each single horizontal well. However, industry expects to initially drill two wells on each well pad, which would reduce the number of truck trips. The well pad would, over time, be developed into a multi-well pad.
2. Each well would require two rigs, a vertical rig and a directional rig.
3. It was conservatively assumed that each well would use approximately 5 million gallons of water total and that all water would be trucked to the site. This is substantially greater than the likely volume of water that would be trucked to the site.



Estimated Number of One-Way (Loaded) Trips Per Well:Vertical Well (New August 2011)

Well Pad Activity	Early Well Pad Development (all water transported by truck)		Peak Well Pad Development (pipelines may be used for some water transport)	
	Heavy Truck	Light Truck	Heavy Truck	Light Truck
Drill pad construction	32	90	25	90
Rig mobilization2	50	140	50	140
Drilling fluids	15		15	
Non-rig drilling equipment	10		10	
Drilling (rig crew, etc.)	30	70	30	70
Completion chemicals	10	72	10	72
Completion equipment	5		5	
Hydraulic fracturing equipment (trucks and tanks)	75		75	
Hydraulic fracturing water hauling3	90		25	
Hydraulic fracturing sand	5		5	
Produced water disposal	42		26	
Final pad prep	34	50	34	50
Miscellaneous	0	85	0	85
Total One-Way, Loaded Trips Per Well	398	507	310	507

Source: All Consulting 2010.

Estimated Truck Volumes for Horizontal Wells Compared to Vertical Wells (New August 2011)

	Horizontal Well with High-Volume Hydraulic Fracturing		Vertical Well	
	Heavy Truck	Light Truck	Heavy Truck	Light Truck
Light-duty trips	831	795	507	507
Heavy-duty trips	1,148	625	389	310
Combined Total	1,975	1,420	905	817
Total Vehicle Trips	3,950	2,840	1,810	1,634

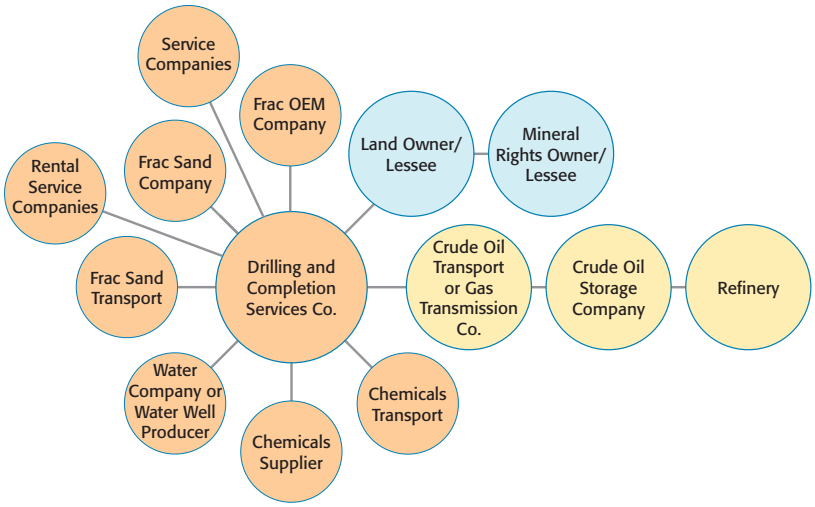
Source: Dutton and Blankenship 2010

Note: The first three rows in this table are round trips; total vehicle trips are one-way trips.

MARKET OVERVIEW – KEY PLAYERS*

Energy Producers (Exploration & Production)	Well Field & Drilling Services	Frac Sand Company	Equipment, Engineering & Construction	Equipments Rental Companies
Independent Oil/Gas Companies	Major Players	Major Players	Major Players	Major Players
Continental Resources EOG Resources Inc. Magellan Petroleum Corp. Petrohawk Energy Corp. Pioneer Natural Resources Inc. Anadarko Petroleum Corp. Chesapeake Energy Corp. Dominion Resources Corp. XTO Energy Inc. Exxon Mobil Corp. Southwestern Energy Quicksilver Resources	Halliburton Company Schlumberger Limited Baker Hughes Incorporated Weatherford International Ltd. Petrofrac Transocean Ltd. BJ Services Major Drilling Group Int'l Petroleum Geo-Services ASA Precision Drilling Corporation Ensco Nabor Inds Ltd. Parker Drilling Pioneer Drilling	Carbo Ceramics DG Concepts Oglebay Norton Co. Texas Silica FlexFrac Baker Atlas Arkhola Sand and Gravel Co. Cal Silica Anthracite Filter Media Co. Western Garnet International	Nat'l Oil Well / Varco Tanaris FMC Corporation Fluor Technip Saipem S.p.A. Jacobs Cameron JGC Corp Keppel Sembcorp Industries	Hertz Arts
Other Players	Other Players	Other Players		Equipment Lease
Ashland Inc. BP p.l.c. Brigham Exploration Company Bonanza Creek Energy, Inc. Chevron Corporation ConocoPhillips Carrizo Oil & Gas Devon Energy Denbury Resources Apache Corporation Delta Petroleum Corporation Forest Oil Corporation Pride International, Inc. Patterson-UTI Energy, Inc. Koch Industries, Inc. Occidental Petroleum Corp Plains E&P Company	Global Industries, Ltd. Superior Energy Services, Inc. Wild Well Control, Inc. Technip Saipem S.p.A. Cudd Energy Services Pride International, Inc. TETRA Technologies, Inc. Nalco Holding Company RPC, Inc. CE Franklin, Ltd. CGGVeritas John Wood Group PLC Wenzel Downhole Tools Ltd. Apache Devon Corporation	Fairmount Minerals Badger Mining Corporation The Manley Bros. Sierra International Inc.	*Note: Most engineering service companies are local/regional operations. Consult your local resource guides for addresses on these companies.*	*Note: Most leasing service companies are local/regional operations. Consult your local resource guides for addresses on these companies.*

*See tabbed section in the associated binder for list of many relevant resources.



Equipment Services Company	Fracturing Equipment Manufacturers	Chemical Transport & Pipeline	Midstream Oil & Gas Transport/Infrastructure	Terminals UST/ Storage	Refinery
Major Players	Major Players	Major Players	Major Players	Major Players	Major Players
Fleetserv EPM	PSI Frac Logistics Stewart & Stevenson	Buckeye GP Holdings L.P. Copano Energy, L.L.C. El Paso Corporation Energy Transfer Equity, L.P. Gas Transmission Northwest Corporation Great Lakes Gas Transmission Company Kinder Morgan Plains All American Pipeline, L.P.	Kinder Morgan, Inc. M3 Midstream American Refining Group, Inc. Dominion Resources, Inc. ExxonMobil Pipeline Company Sunoco Inc. Williams Midstream U.S. Development Corp.	Kinder Morgan Apex Oil Buckeye Terminals Magellan Midstream Partners NuStar Energy Vopak Terminal Westway Terminal World Point Terminals TransMontaigne Motiva Enterprises LLC	CenTrica plc Delek US Holdings, Inc. GeoBio Energy, Inc. Green Mountain Energy Company Hess Corporation Indian Oil Corporation Limited Marathon Oil Corporation NexGen Biofuels Ltd.
Other Players	Other Players	Other Players	Other Players	Other Players	Other Players
Note: Most PM service companies are local/regional operations. Consult your local resource guides for addresses on these companies.	Wabash National Corp. Utility Trailer Manufacturing Great Dane Ltd. Partnership Hyundai Translead Stoughton Trailers Vanguard National Trailer Corp.	Alliance Atlas Pipeline Partners, L.P. Buckeye Boardwalk Pipeline Partners, L.P. Colonial Pipeline Company Duncan E.ON Ruhrgas AG Enbridge Inc. Genesis Energy, L.P. Northern Natural Gas Co. NuStar Energy L.P. ONEOK Partners, L.P. Texas Gas Transmissions, LLC Transneft	Aker Solutions ASA Basic Energy Services, Inc. Bolt Technology Corp. BOURBON Cal Dive International, Inc. Carbo Ceramics Inc. CGGVeritas Dril-Quip, Inc. EGPI Firecreek, Inc. Exterra Energy, Inc. Exterran Partners, L.P. Flint Energy Services Ltd.	Western Refining Company U.S. Oil Co. Tidewater Sunoco Logistics Partners Oiltanking Odfjell Terminals IMTT ITC Ergon Terminaling, Inc. Hess Corp. CITGO Petroleum ARC Terminals Allied Terminals Blackwater Midstream Corp	Alon USA Energy, Inc. Arabian American Development Company Bharat Petroleum Corporation Limited BP Prudhoe Bay Royalty Trust Calumet Specialty Products Partners, L.P. China Petrochemical Corporation CITGO Petroleum Corporation Commercial Energy of Montana, Inc. Cosmo Oil Company, Limited

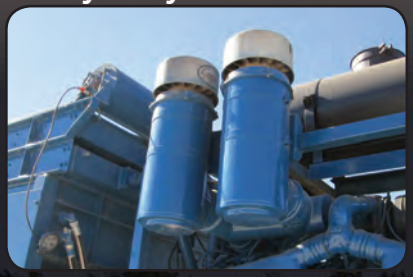
Heavy-Duty Lube Filters

- Extra-Strength Spiral Core that resists high-pressure surges for long duration activity
- Higher Efficiency Filtering Media for extra dirt-holding capacity in harsh environments
- Durable Vibration-Resistant Gasket for a positive seal
- Built for extended change intervals

Heavy-Duty Fuel Filters

- More Efficient Filtration - Durable, leak-proof construction reduces risk of failure during crutial operations
- Easier Installation - Reduces downtime, labor costs and mess associated with changing plastic bowl filters
- Designed for operation in extreme conditions

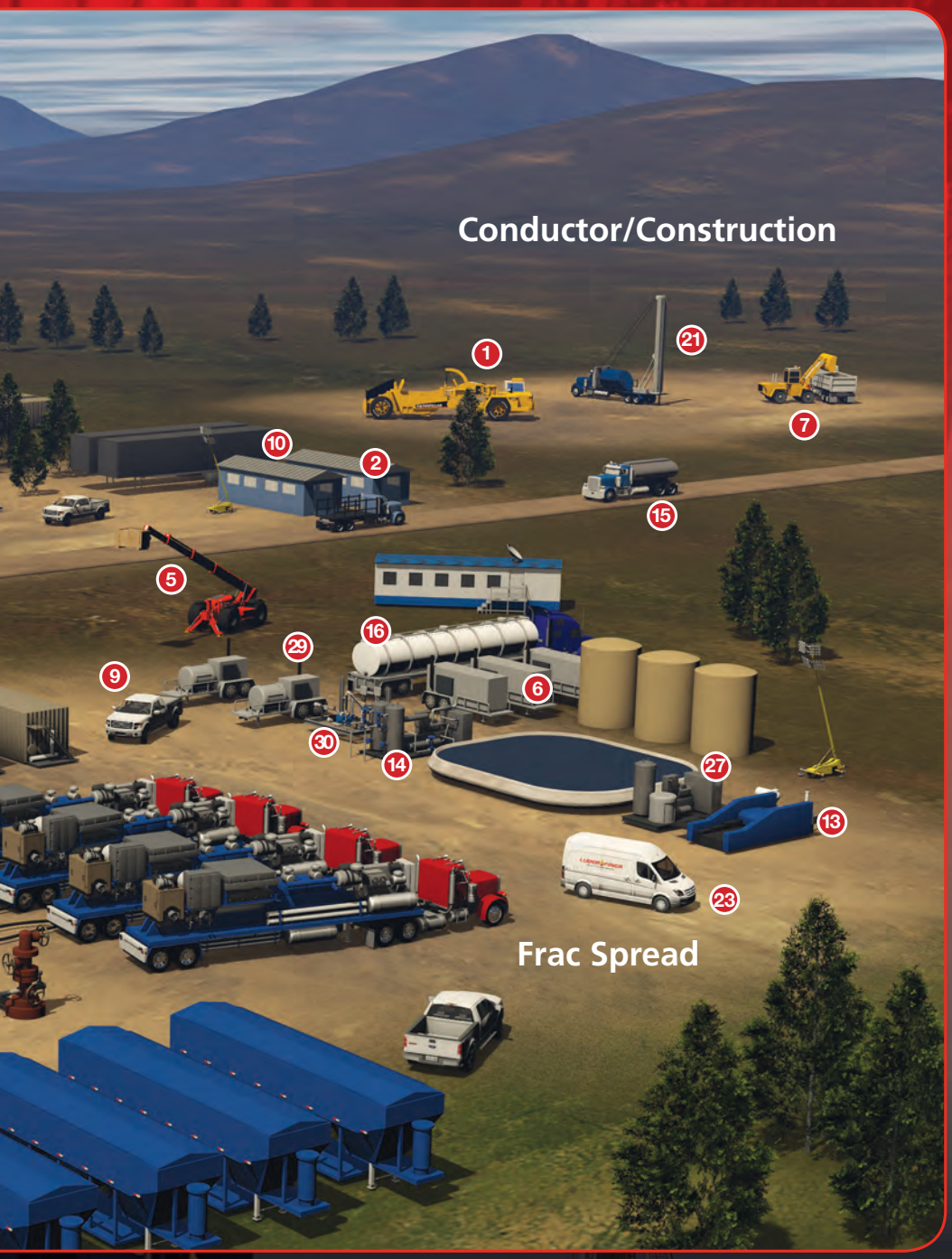
Heavy-Duty Air Filter Filters



- Removes 99.91% of airborne contaminants
- Reduces filter changes and labor costs
- Increased capacity reduces downtime and service
- Reduces engine damage in harsh conditions

Luber-finer Filters are Ideally Suited for:

1) Earth Moving Equipment
2) Power Gen Sets
3) Air Compressors
4) Power Gen for lighting
5) 6k Telehandler - Diesel
6) Forced air heaters
7) Wheel Loader with Bucket
8) Transport trucks
   - Fuel
   - Produced fluids
   - Waste fluids
   - Chemicals/Acids
   - Frack sand
9) Light duty trucks
10) Caterpillar generators
11) Mud pumps
12) Mud tanks
13) Shale shakers
14) MUD CLEANER
15) Diesel fuel tank trailer
16) Water storage



17) Rotary Table
18) Man-rider winch
19) Iron Roughneck
20) Fracing Trucks
21) Small Drill Rig
22) Passenger bus – crew transport
23) Parts truck
24) Mechanic Truck
25) Draw-works
26) Canrig automated catwalk
27) Vacuum Degasser
28) BOP Chain Hoist Handling Systems
29) Skid mounted air compressors
30) Centrifugal pump
31) Wireline truck

Heavy-Duty Hydraulic Filters

- A long lasting, anti-drainback valve for extended protection against dry starts
- Easy-Turn low-torque valve
- All-metal housings that deliver higher burst and pulse-fatigue strength
- High-performance media designed to trap microscopic contaminants
- LH 60 Synthetic Media that delivers high performance and up to 99% efficiency

Heavy-Duty Coolant Filters

- A Durable Epoxy-Coated Shell that resists rust and corrosion during extended service
- Patented Controlled Release Technology (CRT™) that releases controlled levels of supplemental coolant additive to protect against rust, scale and other build-up
- High-Efficiency Synthetic Media designed for extended service levels
- All-Steel Baseplate for durability and strength over extended service levels

Heavy-Duty Cabin Air Filters

- Trap most harmful pollutants before they reach your cab interior
- cleaner, healthier passenger cab during long service operations
- Provide cleaner air from allergens and extreme dust environments

The following types of FRAM/Luber-finer heavy-duty filtration products have been "Built to Do More™" in critical oilfield applications:

Lube Filters

OEM-quality Luber-finer Lube Filters are available in Full-Flow, By-Pass, High-Efficiency and Extended Life options. All styles have been designed, tested and re-engineered with specifically formulated media that meets or exceeds the latest SAE and OE testing and performance requirements for maximum protection from engine wear and equipment breakdown.

Luber-finer Heavy-Duty Lube Filters Feature:

- Seamless Steel Shell for unequaled burst and pulse-fatigue strength
- Extra-Strength Spiral Core that resists high-pressure surges
- Higher Efficiency Filtering Media for extra dirt-holding capacity
- Durable Vibration-Resistant Gasket for a positive seal
- Unique Imperial XL Feature

Imperial XL Lube Filter (Extended Life) Premium-quality Imperial XL lube filters provide exceptional filtration and increased dirt-holding capacity for harsh on-highway and off-highway applications that feature low-temperature startups and full-load operations.

New Luber-finer Time Release Technology (TRT™) TRT filters are a breakthrough in oil-management systems and have been designed to help your fleet extend oil-change intervals by impeding oil degradation in modern diesel engines.* Calculate your TRT maintenance costs at www.luberfiner.com/value-calculator

Fuel Filters

Luber-finer offers a full range of reliable fuel filters that provide the highest in fuel-cleansing efficiency and capacity by trapping harmful contaminants before they can reach vital fuel injectors and carburetors in a vehicle's fueling system. Luber-finer fuel filters also ensure OEM replacement for form, fit and function and are the best insurance for long engine life.

The Luber-finer advantage

- More Efficient Filtration - Durable, leak-proof construction reduces risk of failure
- Easier Installation - Reduces downtime, labor costs and mess associated with changing plastic bowl filters

TotalTec™ Heavy-Duty Fuel Filters

"The Smart Solution - One Filter Does It All." TotalTec™ is a premium-quality "no bowl" heavy-duty fuel filter and an all-in-one alternative to OEM Racor bowl-type fuel separators and features:

- All-Metal Housing for higher burst and pulse-fatigue strength
- High-Performance Media for more dirt-holding capacity and 99% filtering efficiency
- "No bowl" Construction that is a hassle-free alternative to standard fuel separators
- Sensor Port for proper OEM sensor replacement
- Easy-Turn low-torque valve
- No need to order and stock separate filters and plastic bowl add-on components
- Meets or exceeds OEM Requirements

Air Filters

Luber-finer air filters are constructed with a specially blended filter media for optimal dirt-holding capacity, filtering efficiency and maximum protection from harmful airborne contaminants. Available for virtually all air-filtering applications, they offer advanced features that ensure original equipment replacement fit, function and performance.

Real-Time Filtration Solutions That:

- Removes 99.91% of Airborne Contaminants
- Reduces Filter Changes and Labor Costs
- Reduces Downtime
- Reduces Engine Damage from Over-Servicing

MXM Force Air Filters

The new, premium-quality MXM Force Air Filters with revolutionary MicroGold Fiber technology provide an average of 50% more dirt-holding capacity than standard heavy-duty air filters and feature:

- More pleats for longer filter life, enhanced filter performance and maximum dirt-holding capacity
- 99.91% cleaning efficiency

Filter Minder® – For Maximum Filter Life. The Luber-finer Filter Minder is an air-filter gauge that indicates the highest level of restriction advisable when the engine is under load and indicates when it is time for filter replacement.

Cabin Air Filters

Luber-finer Cabin Air Filters—help you breathe clean air.

You can protect yourself and any passengers in the cab of your vehicle from dust, smog and pollen by changing cabin air filters. Cabin air filters from Luber-finer offer superior performance and long life.

Luber-finer Heavy-Duty Cabin Air Filters:

- Trap most harmful pollutants before they reach your vehicle's interior
- Original equipment fit and quality for cleaner, healthier passenger cabin air
- Provide cleaner air to allergy and asthma sufferers
- Most cabin air filter changes take less than 15 minutes

Charcoal-activated Luber-finer Heavy-Duty Cabin Air Filters are also available in Charcoal-Activated Particulate and Odor Removal Media.

Hydraulic Filters

Luber-finer hydraulic filters are designed to meet the demands put on fleet equipment every day. Today's work requirements demand increased performance levels and Luber-finer has responded with premium hydraulic filtration products that protect machinery, both mechanically and chemically.

The Luber-finer hydraulic filter product range features components for on-road vehicles, oil and gas, construction, mining, agriculture, marine and industrial markets. The hydraulic media removes harmful contaminants in the hydraulic fluid through the incorporation of a fluid path that continuously changes its direction as it flows through an intricate maze of media, trapping contaminants.

Luber-finer Heavy-Duty Hydraulic Filters Feature:

- A long lasting, anti-drainback valve for extended protection against dry starts
- Easy-Turn low-torque valve
- All-metal housings that deliver higher burst and pulse-fatigue strength
- High-performance media designed to trap microscopic contaminants
- LH 60 Synthetic Media that delivers high performance and up to 99% efficiency
- Molded O-Ring for easy installation and removal

Coolant Filters

Field-tested Luber-finer coolant filters provide quick and easy maintenance that reduces downtime and costs while prolonging equipment life. Years of research have led to the development of three specialized types of Luber-finer coolant filters, supplemental coolant additives and testing products:

- "Conventional" SCA Coolant Filters
- "Controlled Release" 6500 Series – SCA Coolant Filters with "CRT™"
- "Extended Life" XL Series – Non-SCA Coolant Filters

Luber-finer Heavy-Duty Cooling System Filters Feature:

- A Durable Epoxy-Coated Shell that resists rust and corrosion during extended service
- Patented Controlled Release Technology (CRT™) that releases controlled levels of supplemental coolant additive to protect against rust, scale and other build-up
- A Protective Holding Chamber that keeps CRT™ coolant additives separate from filter media to prevent degradation and provide even release
- High-Efficiency Synthetic Media designed for extended service levels
- All-Steel Baseplate for durability and strength over extended service levels
- Double-Rolled Seam ensures a tight fit

Luber-finer In-Field Coolant Analysis Test Kits and Strips

Affordable, effective and universal, Luber-finer test kits and strips maintain the proper levels of supplemental coolant additives for all applications while taking the work and worry out of cooling-system analysis.

HISTORY OF SHALE OIL

3000 B.C. Mesopotamians used "rock oil" for architectural adhesives, ship caulks, medicines, and roads. Source: http://www.geolsoc.org.uk

1300 The retorting, or processing, of shale began. Source: http://www.eccos.us

1596 The first notable reference to oil from shale was made by a personal physician of Duke Frederick of Württemberg who mentioned that mineral oil distilled from oil shale could be used for healing. Source: http://www.britannica.com

1694 During the reign of William and Mary, British Crown Patent No. 330 was granted to three subjects who had found "a way to extract and make great quantities of pitch, tarr, and oyle out of a sort of stone." Source: http://www.britannica.com

1781 A patent was granted to Archibald Cochrane, 9th Earl of Dundonald in Scotland, for an extraction process that produced tar, pitch, and oil from coal and shale using masonry retorts and wooden condensers. Source: http://www.eccos.us

1859 The Scottish oil shale industry began in 1859, the same year Colonel Drake drilled his pioneer well at Titusville, Pennsylvania. Source: http://emd.aapg.org

1920 The Mineral Leasing Act removed oil shale and certain other fossil fuels and minerals on public lands administered by the Federal Government from the status of locatable to leaseable minerals. Source: http://www.qer.com.au

1929 In Texon, Texas, the first "true horizontal well" was drilled.

1940s Halliburton invented the process of injecting a mixture of water, sand and chemicals into underground rock formations to blast them open and release natural gas.

1948 Hydraulic fracturing first commercially employed.

1970 Interest in oil shale in the United States grew as oil embargoes, supply disruptions, and high prices took their toll on the United States economy. Source: http://www.fas.org

1991 The last oil shale retort in the United States, operated by Unocal Corporation closed.

2000 Lyco Energy was the first company to drill horizontal wells in the Bakken.

2004 Range Resources becomes the first company to drill a Marcellus Shale well in Pennsylvania

2008 PetroHawk Energy Corp drills first horizontal well in Eagle Ford using hydraulic fracturing and discovers oil.

2009 IOGCC passed resolution opposing hydraulic fracturing regulation under SDWA.

2010 Eagle Ford proclaimed the hottest oil play in the United States.

2011 Oil companies are projected to spend $25 billion to drill 5,000 new wells in the United States.

2012 U.S. oil production reaches 6.4 million barrels per day, highest since 1998

2013 More than 3,000 new wells are expected to be drilled in the Bakken formation; oil companies predicted to spend $28 billion in Eagle Ford play

Glossary of Terms

Abandonment: Oil-and-gas production facilities, located either above or below ground, that are not currently being operated, but are not permanently closed and secured from an environmental perspective

Accidental Release: Unintentional releases of oil, produced water, process chemicals and/or natural gas to the environment via human error, equipment malfunction or major equipment failure

Ancillary Equipment: In oil-and-gas production, including, but not limited to, the following equipment: auxiliary pumps, pressure relief devices, sampling connection systems, open-ended valves, line valves, and flanges connected to and involved in the proper functioning of a major assemblage of equipment (compressor, pump or distillation tower)

API Gravity: The weight per unit volume of hydrocarbon liquids relative to water as measured by a system recommended by the American Petroleum Institute (API). The measuring scale is calibrated in terms of degrees API where pure water is defined as 10 degrees. All degrees higher than 10 are less dense (i.e. they float) than water and all values less than 10 degrees are more dense (i.e. they sink) than water

Assignment: The legal instrument whereby Oil & Gas leases or overriding royalty interests are assigned/conveyed

Associated Natural Gas: All natural gas that is produced in conjunction with crude oil

Bitumen: A naturally occurring viscous mixture consisting of hydrocarbons heavier than pentane and other contaminants which, in its natural state, will not flow under reservoir conditions or ambient temperature; often referred to as ultra-heavy crude oil

Blanket Gas: A fuel gas or any inert gas used in conjunction with gas-purge systems that are designed to reduce vapor emissions and ensure that oxygen does not enter the vapor space in a storage tank or vessel

Blowdown: The act of depressurizing process equipment and piping, usually to a vent or flare

Casinghead Gas: Natural gas that is produced or vented from an oil-well casing when the crude oil is extracted through a tube that extends inside the well casing down to the reservoir

Central Bitumen Processing Facility: Features boilers that generate steam that is injected into the reservoir to heat the bitumen, which allows the bitumen, water and amounts of natural gas that are produced to be sent to the central processing facility to be separated

Central Crude Oil Treating Plant: Battery system or arrangement of tanks and other surface equipment without any directly associated wells where crude oil is processed primarily to reduce water and volatile gases before transport to a refinery

Closed-Vent System: A system that is not open to the atmosphere and is composed of piping, ductwork, connections and, if necessary, flow-inducing devices that transport gas or vapor from a discharge point to one or more control devices

Cold Recovery: The production of crude oil that does not involve the use of any thermal techniques

Compressed Natural Gas (CNG): Natural gas that is compressed into high-pressure fuel cylinders for use as a transportation or stationary engine fuel

Compressor Station: Contains service equipment that increases the flowing pressure of the gas that it receives from a well, battery, gathering system or transmission pipeline for delivery of natural gas to processing, storage or markets

Control Device: Any equipment used for recovering or oxidizing vented hydrocarbon vapors, including absorbers, carbon absorbers, condensers, incinerators, flares and vapor-recovery units

Conventional Crude Oil/Natural Gas: Crude oil/natural gas that is produced and flows freely from higher permeability reservoirs in easily accessible locations and where reservoir conditions do not require modification to economically extract the crude oil or natural gas

Crude Oil: A mixture of hydrocarbons ranging from one carbon (methane) to hundreds of carbon atoms that exist in the liquid phase in natural underground reservoirs and remains liquid at atmospheric pressure and ambient or elevated temperature after passing through surface separation facilities

Custody Transfer: A metering point at a location where a commodity such as natural gas is measured for sale from one party to another

Custody Transfer Point: The point where ownership of hydrocarbon liquids or natural gas is transferred from a seller to a buyer or transporter

Diluent: Light petroleum liquids used to reduce the viscosity of heavy crude oil, or fractions, particularly bitumen, so that it can flow more easily through pipelines.

Dissolved Natural Gas: Natural gas that is in solution with crude oil in the reservoir at reservoir conditions (temperature and pressure); referred to as associated gas when produced and separated from crude oil

Distillates: Typically used to denote hydrocarbon boiling range fractions that are too high in boiling point to be blended into gasoline range products, generally greater than a 350ºF (170ºC) initial boiling point. Distillate products include kerosene, diesel and Nos. 1, 2, 4 and 5 fuel oils.

Dragline: A large machine that digs oil sand ore from a mine pit and transfers it into windrows

Drilling Permit: In states that regulate well spacing, a drilling permit is the authorization to drill at a specified location; also known as a "well permit"

Dry Natural Gas: Field natural gas that does not require any processing to meet pipeline-quality dew-point requirements

Enhanced Recovery: The production of crude oil using secondary and/or tertiary recovery techniques

Equipment Leaks: Emissions of natural gas or hydrocarbon liquids from equipment components

Field Dehydrator: A dehydration unit located upstream of a natural gas processing plant or battery that controls the amount of hydrates in gas that is destined for a processing plant

Field Natural Gas: Natural gas extracted from a production well prior to its entering the first stage of processing, such as dehydration

Filling Losses: Losses that occur during the filling of tank trucks, tanker railcars and marine tankers

Flare: An open flame used for routine or emergency disposal of waste gas

Flaring: A common method of safely disposing by combustion waste-gas volumes at oil-and-gas facilities

Flow Indicator: A device that indicates the relative flow rate of gas or liquid in a pipeline or duct

Fracking: The process of pumping fluids into a productive formation at high rates of injection to hydraulically break the rock. The "fractures" which are created in the rock act as flow channels for the oil and gas to the well.

Fuel Combustion: Emissions from the consumption of all types of fuel typically occurring at oil-and-gas facilities in both internal and external combustion devices

Fugitive Emissions: Emissions that are emitted unintentionally through a stack or vent

Fugitive Equipment Leaks: The unintentional loss of process fluid to the environment past a seal, connector, cover, valve seat, flaw or minor damage point; can be due to normal wear and tear, improper assembly or use, manufacturing defects, damage during installation, inspection or maintenance, corrosion, fouling during use, and environmental effects

Gas Conditioning: The processing that is done to a raw natural gas stream in order for it to meet sales gas specifications with respect to H2S content, water and hydrocarbon dew points, and heating value

Gas Fractionation: A distillation process that separates natural gas and refinery/upgrader off-gases into their constituent boiling fractions in order to recover specific natural gas liquids

Gas Oil: Medium to heavy distillate oil fractions distilled from crude oil and secondary units at refineries and upgraders, which is used to produce diesel fuel and heavier fuel oils

Gas Production: Total natural gas output from a specific oil-and-gas well

Gas Sweetening: A process that is used to remove hydrogen sulfide (H2S) and carbon dioxide (CO2) from the gas stream

Gate Station: A station ay which natural gas changes ownership and where it is commonly odorized and allowed to flow through a splitter system for distribution to different districts or areas

Gas-to-Oil Ratio (GOR): The ratio of the volume of natural gas per unit to volume of crude oil or other hydrocarbon liquid

Greenhouse Gases: Gases that trap heat in the atmosphere; primary greenhouse gases ate carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O) and fluorinated gases

Heavy Crude Oil: A category of crude oil characterized by relatively high viscosity, a higher carbon-to-hydrogen ratio and a relatively higher density; heavy crude is typically more difficult to extract with conventional recovery techniques and is more costly to refine

Hydrate Control: The suppression of hydrate formation in natural gas gathering systems by dehydration, methanol addition of heat addition

Hydraulic Fracturing (Fracking): A method of stimulating production from a formation of low permeability by inducing fractures and fissures in the formation by applying high fluid-pressure to the face of the formation, forcing the strata apart.

Hydrocarbon Dew Point Control: The process that removes condensable hydrocarbons from natural gas in order to control the temperature at any given pressure at which the liquid hydrocarbon initially condenses from a gas or vapor

Injection Facility: Facility constructed and operated for the purpose of moving wastewater and other liquids or gases into a depleted petroleum or gas reservoir

Inlet Separation: A vessel located at the entrance to a hydrocarbon facility that separates a multi-phase incoming product stream into different components, such as gas, oil or condensate, and water

Leak Detection and Repair (LDAR): Common approach for reducing volatile organic compound (VOC) and hazardous air pollutant (HAP) emissions by detecting and fixing fugitive equipment leaks

Light/Medium Crude Oil: A category of crude oil characterized by relatively low viscosity, a lower carbon-to-hydrogen ratio and a relatively lower density

Line Heater: An indirectly fired heater that is used to heat the fluid in the pipeline to above hydrate formation or freezing temperatures

Liquefied Natural Gas (LNG): Natural gas that has been refrigerated to -256ºF (-160ºC) to condense it into a liquid

Liquefied Petroleum Gas (LPG): A natural gas mixture composed of mainly ethane, propane and butanes, with small amounts of pentanes plus, in any combination

Loading/Unloading Losses: The amount of hydrocarbon vapors that are released to the atmosphere during the loading and unloading of tankers (truck, rail or marine)

Low Pressure Point (LPP): The point of lowest pressure in a piping system

LPG Storage: A facility for storing liquefied petroleum gas, typically in pressurized spherical or cylindrically steel tanks

Metering and Pressure Regulator Station: A gas distribution facility for metering and reducing the pressure of natural gas that is being supplied to a local distribution network

Meter Station: A facility designed to accurately measure the volume of natural gas that is passing through a pipeline

Natural Gas: A naturally occurring mixture of hydrocarbon and non-hydrocarbon compounds existing in the gaseous phase, or in solution with hydrocarbon liquids in geologic formations beneath the earth's surface. The principal hydrocarbon constituent is methane.

Natural Gas Battery: A system or arrangement of surface equipment that receives primarily gas from one or more wells prior to delivery to a gas gathering system, to market or to other disposition

Natural Gas Cycling: An enhanced petroleum recovery technique that takes produced natural gas and condensate and injects it back into the reservoir to increase pressure and increase the production of natural gas liquids

Natural Gas Gathering System: A facility consisting of gas lines that are used to move products from individual wells to booster compressor stations and one gathering station to another or a processing plant or transmission pipeline

Natural Gas Group Battery: A production facility consisting of two or more flow-lined natural gas wells having individual separation and measurement equipment, but a common surface location

Natural Gas Processing Plant: A processing facility used for extracting from natural gas helium, nitrogen, ethane or natural gas liquids, and/or the fractionation of mixed natural gas liquids into natural gas products

Nitrous Oxide (N20): A product of combustion and a powerful greenhouse gas

Nitrogen Oxides (NOx): All forms of oxidized nitrogen that are found in a particular emission source

Non-Associated Natural Gas: Natural gas that is produced from a predominantly natural gas pool (e.g., not associated with crude oil, including bitumen)

Odorized Gas: Natural gas that contains additives to impart odor; common odorants include mercaptan, organic sulfides and/or a blend of both

Offshore Production Platform: Platform from which development wells are drilled and that can carry all the associated processing plants and other equipment needed to maintain a field in production and pump or compress oil and gas to sub-sea pipelines to shore or to floating production storage and offloading (FPSO) facilities

Oil Sands: A term applied to particular geographical areas having bituminous sands, as well as deposits of other heavy crude oil

Oil Shale: A laminated, sedimentary rock that contains a solid, waxy hydrocarbon called kerogen that is commingled with the rock structure

Open-Ended Valves and Lines: Any valve that may release process fluids directly to the atmosphere in the event of leakage past the valve seat

Particulate Matter (PM): The portion of flue gas that exists as a solid or liquid droplet when it leaves the stack and cools to ambient conditions

Petroleum: A term sometimes used as a substitute for crude oil and sometimes as a collective term for natural gas and crude oil

Petroleum Liquids: Liquid hydrocarbons such as crude oil, diluted bitumen, natural gas liquids, condensate, etc.

Pig: A device that is inserted into a pipeline and pushed along by the flowing fluid to perform any number of functions, including cleaning, displacement, batching or internal inspection; gets its name from the squealing noises the pipeline "pigs" made when first used

Pig Launcher: A piping arrangement that allows pigs to be inserted into a pipeline without stopping flow

Pig Receiver: A piping arrangement that allows pigs to be removed from a pipeline without stopping flow

Pipeline System: A network of pipes used to transport gases and liquids

Pipeline Leak: Fugitive emissions through a small opening in the wall of the pipeline, generally due to corrosion or material defects, or from valves, fittings or connectors

Pressure Relief Valves: Protect process piping and vessels from being accidentally over-pressurized

Primary Recovery: The production of crude oil using natural reservoir pressure and/or a simple downhole pump

Produced Water: Water that is extracted from the earth from a crude oil or natural gas production well, or that is separated from crude oil, condensate, or natural gas after extraction

Produced Water Storage: Atmospheric storage tanks used to store produced water from oil-and-gas facilities prior to transporting it to a disposal or re-injection facility

Pump Seals: Packing, with or without a sealant, on positive displacement pumps that controls leakage around the pump shaft

Reciprocating Compressor: A compressor with a piston in the cylinder that increases the pressure of the process gas through positive displacement

Reciprocating Compressor Packing System: Controls leakage around the piston rod on each compressor cylinder

Refrigeration: A process for chilling natural gas to extract condensable heavier-than-methane hydrocarbon fractions and controlling the hydrocarbon dew point of the natural gas stream

Regulation Station: A facility designed to regulate the flow rate and/or pressure of natural gas that is passing through a pipeline

Relief Device: Opens to release process fluids at a pressure below that which will rupture or damage process vessels or piping

Safety Device: Meets both of the following conditions: not used for planned or routine venting of liquids, gases or fumes, and remains in a closed, sealed position at all times except when an unplanned event requires that the device open for the purpose of preventing physical damage or permanent deformation of the unit or equipment on which it is installed

Sales Meter Station: A station that measures the amount of natural gas being withdrawn from a gas transmission system by a customer

Secondary Recovery: The production of crude oil using reservoir flooding with water or natural gas to displace crude oil to producing wells

Service Lines: The pipe that delivers natural gas from a distribution main or transmission pipeline to the customer's meter

Shale: A very fine-grained sedimentary rock formed by the consolidation and compression of clay, silt or mud. It has a finely laminated or layered structure. Shale breaks easily into thin parallel layers; a thinly laminated siltstone, mudstone, or claystone. Shale is soft, but sufficiently hard packed (indurated), so as not to disintegrate upon becoming wet. However, some shales absorb water and swell considerably, causing problems in well drilling. Most shales are compacted and, consequently, do not contain commercial quantities of oil and gas.

Solution Natural Gas: Natural gas that is in solution with produced crude oil

Sour Crude Oil: Crude oil containing free sulphur, hydrogen sulphide or other sulphur compounds

Sour Natural Gas: Raw natural gas that contains quantities of hydrogen sulphide (H2S), carbon dioxide (CO2), and other sulphide-based compounds in sufficient quantities to pose a public safety hazard if released

Spheroid/Bullet Tanks: Spherical or horizontal cylindrical pressure vessels used to store pressurized gas or liquids with high vapor pressures

Steam Generators: A water boiler used to generate steam for electric generation or use in thermal oil production schemes, gas-processing plants and petroleum refineries as a source of heat or gas stripping

Storage Vessel: A tank or other vessel designed to contain an accumulation of crude oil, condensate, intermediate hydrocarbon liquids or produced water

Sulphur Recovery: A unit that converts hydrogen sulphide (H2S) removed from sour gases and hydrocarbon streams to elemental sulphur

Suspension: The cessation of normal production, operation or injection activities at a facility

Sweet Natural Gas: Raw natural gas with a relatively low concentration of sulphur compounds, such as hydrogen sulphide

Tailings: A combination of water, sand, silt and fine clay particles that are a byproduct of removing bitumen from oil sand

Tailings Pond: An open lagoon in which wastewater contaminated with solid pollutants is placed and allowed to stand. The solid pollutants in the water sink to the bottom of the lagoon. Depending on the design, liquid contaminated with dissolved pollutants may be allowed to overflow out of the enclosure.

Tank: A device designed to contain liquids at atmospheric pressure

Tertiary Recovery: The production of crude oil using sophisticated techniques such as reservoir flooding with critical phase CO2 or lighter hydrocarbons such as ethane; it also encompasses all thermal recovery techniques

Thermal Recovery: The production of crude oil that involves the use of one or more thermal techniques whereby heat is introduced into the crude oil reservoir or bituminous sands (oil sands) deposit to enhance the ability of the crude oil to flow and thereby facilitate its recovery

Total Petroleum Stocks: The volume of crude oil (including lease condensate), natural gas plant liquids and petroleum products held by crude oil producers, storers of crude oil, companies transporting crude oil by water, crude oil pipeline companies, refining companies, product pipeline companies and by bulk terminal companies

Transmission Pipeline: A pipeline used to transport processed, normally unodorized natural gas to market

Transmission Stations: Facilities that re-compress natural gas in cross-country pipelines and handle normally unodorized gas

Treating: A variety of processes that are used to remove impurities from hydrocarbon streams, such as water, carbon dioxide, hydrogen sulphide and nitrogen

Transport Systems: A system for transporting crude oil, NGL and natural gas to upgraders and refineries

Turnaround: A routinely scheduled large-scale maintenance activity wherein an entire process unit is taken offstream, evacuated of process fluids and inspected inside and out for comprehensive revamp and renewal

Unconventional Natural Gas: Natural gas produced from one of the following sources: coal bed methane (CBM), tight gas in ultra-low permeability rocks, gas in ultra-low permeability shales or gas hydrates (under sea and land)

Unconventional Oil: Petroleum produced or extracted using techniques other than the conventional (oil well) method. Oil industries and governments around the globe are investing in unconventional oil sources due to the increasing scarcity of conventional oil reserves. Although the depletion of such reserves is evident, unconventional oil production is a less-efficient process and has greater environmental impact than that of conventional oil production.

Unreported Venting: Venting from processes or equipment that is not typically reported in production accounting data

Valve: A device used to control the flow of fluid

Venting: Continuous or intermittent emissions to the atmosphere by design or intentional operational practice

Vessel: A container used for storing or handling an accumulation of liquids under pressurized conditions

Volatile Organic Compounds (VOC): Carbon compounds, excluding carbon monoxide and carbon dioxide, that exists in a gaseous state in ambient air and participates in atmospheric photo-chemical reactions; common forms include methane, ethane, methylene chloride, methyl chloroform, acetone, many fluorocarbons and certain classes of per fluorocarbons

Wastewater Injection Facility: Facility constructed and operated for the purpose of moving waste-produced water (brine) into a petroleum reservoir or underlying saline aquifer

Water Treatment Facility: A facility for removing suspended and dissolved solids from raw water as necessary in order to make it suitable to generate steam

Sources

"IEA Pegs U.S. as Top Oil Producer by 2020":
http://online.wsj.com/article/SB10001424127887323894704578114492856065064.html

"U.S. crude oil production in first quarter of 2012 highest in 14 years":
http://www.eia.gov/todayinenergy/detail.cfm?id=6610#

"Canada oil sands output seen beating projections":
http://www.reuters.com/article/2012/05/17/canada-oilsands-forecast-idUSL1E8GHGSI20120517

U.S. Energy Information Administration:
http://www.eia.gov

EIA Short Term Energy Outlook, November 2012:
http://www.eia.gov/forecasts/steo/pdf/steo_text.pdf

EIA's Canada Analysis Brief:
http://www.eia.gov/countries/analysisbriefs/Canada/canada.pdf

BP Statistical Review of World Energy 2012:
http://www.bp.com/assets/bp_internet/globalbp/globalbp_uk_english/reports_and_publications/statistical_energy_review_2011/STAGING/local_assets/pdf/statistical_review_of_world_energy_full_report_2012.pdf

Ancillary Benefits to Oil & Gas Boom:
http://www.manhattan-institute.org/html/pgi_01.htm

Shale Fields North America:
http://www.oilshalegas.com/shalefields.html

United States Shale map:
http://peakroyalties.com/why-are-they-great

Bakken Shale map:
http://bakkenshale.com/geology/attachment/williston_basin-2/

Eagle Ford Shale map:
http://eaglefordshale.com/maps/attachment/eagle-ford-shale-map-800x614-2/

Green River Formation map:
http://webhosting.web.com/imagelib/sitebuilder/misc/show_image.html?linkedwidth=actual&linkpath=http://www.oilshalegas.com/sitebuildercontent/sitebuilderpictures/greenriverformationmap.jpg&target=tlx_picqcdr&title=Map%20of%20Green%20River%20Formation%20-%20Oil%20Shale

Marcellus Shale map:
http://www.anklebytes.com/

Canadian Oil Sands:
http://www.exxonmobil.com/Corporate/Files/iol_oilsands_brochure.pdf

Athabasca Oil Sands map:
http://www.oilsands.alberta.ca/reclamation.html#JM-OilSandsArea

Upstream/Midstream Oil & Gas Production:
Supply-Chain Management Issues In The Oil And Gas Industry, Journal of Business & Economics Research – June 2007 Volume 5, Number 6

The Oil and Gas Industry Supply Chain for the Pittsburgh Regional Alliance, Taimerica Management Company, July 2011

Supply Chain Strategy in the Oil and Gas Sector, Eric Anderson, Supply Chain Management Strategist, Exploration & Production: The Oil & Gas Review 2003

Oil and Gas Services Sector Profile Sector Overview - Canadian Oil and Gas Industry 2012-02-29, http://www.ic.gc.ca/eic/site/ogt-ipg.nsf/eng/og00199.html

Oil & Gas Regulations:
http://money.cnn.com/2012/04/18/news/economy/drilling-regulations/index.htm

U.S. Oil & Gas Law:
http://www.hg.org/oil-and-gas-law.html

"Obama tightens oil and gas drilling regulations":
http://money.cnn.com/2012/04/18/news/economy/drilling-regulations/index.htm

Final Amendments to Air Regulations for the Oil and Natural Gas Industry:
www.epa.gov/airquality/oilandgas

Albert Energy Regulator:
http://www.energy.alberta.ca/Org/pdfs/FSbill2EnergyRegulator.pdf

Oil & Gas Infrastructure:
http://www.giiresearch.com/press/7102.shtml

Glossary of Terms:
http://www.ontime.methanetomarkets.org/m2mtool/glossary.aspx

APPENDIX

WHAT IS THE DIFFERENCE BETWEEN *OIL SHALE* AND *SHALE OIL*?

There's a huge difference between **oil shale** and oil produced from shale reservoirs, often called **shale oil**. The former remains a promising, yet expensive-to-produce resource that may eventually see more development.

The latter generates significant, real production growth for North American energy producers and related drilling, production and midstream players. When crude oil reaches $70 to $80 a barrel, many shale oil projects are generating an after-tax return on investment of as much as 100%. In the core of the Bakken, for example, producers only need oil prices in the $35 to $40 range to earn solid returns on their drilling programs.[34]

Oil shale is an inorganic rock that contains a solid organic compound known as kerogen. The term "oil shale" is a misnomer because kerogen isn't crude oil, and the rock holding the kerogen often isn't even shale.

Shale oil, unlike oil shale, does not have to be heated (retorted) over a period of months to flow into a well. And the oil produced from these plays is crude; in fact, many producers say it's even better quality, on average, than West Texas Intermediate (WTI), the U.S. standard crude that's the basis for NYMEX futures.[35]

There are several competing technologies for producing oil from shale, including:

- **Mining & Surface Retorting** – underground or surface mining; retorted on the surface (expensive, time consuming and environmentally harsh compared to other methods)
- **Thermal Retorting** – where the shale is heated underground and converted to liquid (expensive, time-consuming and currently not commercially viable)
- **Horizontal Drilling & Hydraulic Fracturing** (faster, more affordable and less environmentally intrusive)

Shale oil plays are unconventional fields. Without getting too technical, natural gas and oil don't exist underground in some giant cavern or lake waiting to be pumped to the surface. Rather, hydrocarbons are found trapped in the pores and cracks of a reservoir rock. A typical conventional reservoir rock is sandstone; sandstone looks like a mass of sand particles stuck together to form a rock. Sandstone has many pores that are capable of holding hydrocarbons. In other words, sandstone has favorable porosity.

Typically, those pores are also well connected so that oil and gas can easily travel through sandstone reservoir rock. Such rocks have a high degree of permeability. When a producer drills a well in a conventional field, oil and gas travel through the reservoir rock and into the well, powered mainly by geologic pressures. Shale fields and other unconventional fields aren't particularly permeable. That means while there is plenty of oil and/or gas in the rock, there are no channels through which that oil or gas can travel. Thus, even in shale fields where there's plenty of geologic pressure, the hydrocarbons are essentially locked in place.

Producers have developed and refined two major technologies in recent years to unlock shale: horizontal drilling and hydraulic fracturing.

NOTES:

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