Chapter 3

Domestic Petroleum

The U.S. economy runs on oil. We rely on oil to drive our cars, trucks and trains, and to heat and light our homes. In fact, in 2013, 36% of the energy used in the United States was generated from oil. U.S. EIA, “Oil Explained.” Oil is derived from both domestic and imported sources. EIA, “Where Is Oil Produced?”

This chapter describes the history of petroleum in the United States and its modern-day role as the primary fuel for transportation. We then look at the steps that petroleum takes in its journey from primary energy input to transportation fuel. We next consider how domestic oil production and transportation is regulated. Finally, we consider the future of domestic oil, particularly with new “fracking” technologies that have created a resurgence of domestic production.

According to the energy “input/output” chart (below), domestic oil constitutes about 16.2% of total U.S. primary energy. Today oil mostly powers the transportation sector.

In this chapter, you will learn about:

• The basics of petroleum production
  o What petroleum is – a mixture of crude oil and natural gas
  o How oil rights exist between landowners and oil companies
  o The stages in production from well to refinery
  o How global events affect domestic oil prices

• The history of oil regulation in the United States
  o The common law “rule of capture”
  o The incentives it creates for waste in the production of oil

• State conservation regulation
  o How states have sought to optimize oil production
  o Secondary oil recovery and its recent history
  o The “unitization” of oil fields
  o The “rule of capture” applied to hydraulic fracturing

• The offshore drilling
  o How offshore drilling happens
  o The different regulation of offshore drilling
  o Oil drilling in Alaska (including a pipeline from Alaska to Chicago)
  o The potential for environmental damage (including the story of BP oil spill in the Gulf of Mexico)

• The regulation of oil spills and transportation
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3.1 Basics about Domestic Petroleum

We begin with a look at domestic petroleum. We consider some of the basic terminology used in the oil industry and thus relevant to domestic oil regulation. We take a preliminary look at the ownership of domestic oil and how private landowners lease their oil (and other mineral) rights to oil companies. We then review how the oil business works in the United States. Finally, we sketch how world oil prices and global events have shaped the price of oil – here and abroad.

3.1.1 Terminology

The following are key terms that help aid the study of both domestic and international petroleum, also known as crude oil. In considering the below definitions, it is important to note that 62% of the energy used in the United States today is generated from oil and gas.

- **Petroleum / Crude Oil.** Crude oil “is a naturally occurring, flammable liquid consisting of a complex mixture of hydrocarbons of various molecular weights and other liquid organic compounds that are found in geologic formations beneath the Earth's surface.” [Wikipedia, “Petroleum.”](https://www.wikipedia.org) Crude oil “is the term for ‘unprocessed’ oil. It is also known as petroleum. Crude oil is a fossil fuel, meaning that it was made naturally from decaying plants and animals living in ancient seas millions of years ago -- most places you can find crude oil were once seabeds. Crude oils vary in color, from clear to tar-black, and in viscosity, from water to almost solid.” [HowStuffWorks, “How Oil Refining Works.”](https://www.howstuffworks.com)

- **Natural Gas.** Natural gas is a gas consisting primarily of methane, typically with 0–20% higher hydrocarbons (primarily ethane). It is found associated with other hydrocarbon fuel, in coal beds, as methane clathrates, and is an important fuel source and a major feedstock for fertilizers. [Wikipedia, “Natural Gas.”](https://www.wikipedia.org)

“Oil and natural gas together make petroleum.” [Energy4Me, "Petroleum - Oil and Natural Gas."](https://www.energy4me.org) The word “petroleum” means “rock oil” or “oil from the earth.” [U.S. EIA, “Oil Explained.”](https://www.energy.gov) Generally, the law treats petroleum as a single commodity regardless of whether it consists of crude oil, natural gas, or a mixture of both. For example, standard leases between landowners and oil companies apply to both oil and gas. For other purposes, however, the two are treated and regulated separately. For example, oil pipelines are regulated differently from gas pipelines.

Oil and natural gas are found in small spaces (called pores) between layers of rock deep within the Earth. [Energy4Me, "Petroleum - Oil and Natural Gas."](https://www.energy4me.org) When the quantities of discovered petroleum are large enough to be produced profitably, the location is usually given a specific name, such as the “Seminole Field.” [See Oklahoma Historical Society’s Encyclopedia of Oklahoma History & Culture, “Seminole Field.”](https://www.okhistory.org) Some fields produce only gas while others produce mainly oil. The Prudhoe Bay Oil Field, located in northern Alaska, is the largest oil field in the United States and North America. [Wikipedia, “Prudhoe Bay Oil Field.”](https://www.wikipedia.org) It contains 25 billion barrels of original oil and an estimated 46 trillion cubic feet of natural gas in an overlying gas cap. [BP, Prudhoe Bay Fact Sheet.](https://www.bp.com)

3.1.2 Oil and Gas Lease

Oil and gas law in the United States generally differs significantly from laws in other countries around the world. In the United States, oil and gas are often owned privately as opposed to being
owned by the national government in many other countries. Wikipedia, "Oil and Gas Law in the United States." In these other countries, national oil companies, such as Pemex in Mexico, typically develop the oil and gas often in conjunction with multinational corporations, such as ExxonMobil.

In the United States, a complex legal framework composed of property, contract, and tort law governs oil and gas, which is regulated by the individual states through statutes and common law as well as federal and constitutional law. Besides private ownership, the federal government owns substantial mineral resources (including oil) on public lands, which comprise about 30% of the total land area of the United States.

Do oil and gas companies own the land they drill on? Typically, no. Instead, the oil and gas company leases the mineral rights from the owner pursuant to an oil and gas lease. The typical oil and gas lease has three basic clauses:

1) **Granting Clause.** The granting clause transfers the mineral estate under the described land from the lessor (usually the landowner) to the lessee (usually an oil and gas company).

2) **Habendum Clause.** The habendum clause typically reads: “This lease shall be for a primary term of ___ years and as long thereafter as oil or gas is produced from said land.” The lessee will want the rights (but not the duty) to develop a leasehold for a certain time. And, if promising deposits are found, the lessee will want the right to hold the lease for as long as profitable production occurs.

3) **Royalty Clause.** The royalty clause typically grants the lessor a 12.5% or 1/8 royalty on all the oil and gas produced from the lease.

The typical lessor does not have the expertise to develop the oil and gas and thus transfers that exclusive right to the lessee. In return, the lessor is often paid in three forms: bonus, rental, and royalty. Wikipedia, “Oil and Gas Law in the United States.” The bonus is a one-time, up-front payment made at the time the lease takes effect. “The rental is an annual payment, usually made until the property begins producing oil and gas in commercial quantities. The royalty is a portion of the value of any oil or gas produced from the lease.”

The habendum and royalty clauses allow landowners and oil and gas companies to allocate the risk of loss and the potential for profits based on each party’s economic goals. There are entire law school courses on Oil and Gas Law covering the main points of such leases.

### 3.1.4 Oil Business

There are five stages in the value chain of oil production: (i) exploration, (ii) production, (iii) refining, (iv), transportation, (v) and distribution. The largest companies in the oil industry are vertically integrated and operate in all five stages of the value chain.

**Exploration.** The exploration phase includes the search for oil or gas through detailed geological and geophysical surveys followed up where appropriate by exploratory drilling. Colorado Oil and Gas Conservation Commission, “Glossary of Oil and Gas Terms.” Oil exploration typically depends on highly sophisticated geophysical technology to detect and determine the extent of
potential structures. Atlantic Petroleum, “The Oil Exploration and Production Cycle.” Petroleum geologists lead the exploration staff, using tools to look for permeable rock where oil and gas are trapped. Despite improvements in technology, any exploratory “wildcat well” (drilled away from known oil or gas fields) remains a gamble. See Wikipedia, “Oil Well.”

Interestingly, more than 42,000 oil fields have been found around the world to date, but the 400 largest oil fields (representing only 1 percent) contain more than 75% of all oil ever discovered. See Countdown for Peak Oil Production (2004).

**Production.** The production stage is the most important stage of a well’s life, when the oil and gas are actually produced. Wikipedia, “Oil Well – Production.” The efficient recovery of crude oil from tiny pore spaces in a reservoir rock is complicated. Two factors must be controlled to produce a reservoir efficiently: (1) the rate of production, (2) and the location of wells. For each reservoir, there is generally a dominant displacement mechanism, an optimal pattern of well location, and a maximum efficient rate of production. See US Legal, Maximum Efficient Rate [MER] Law & Legal Definition. For example, natural gas should not be removed from an oil well first because that removes a potential displacement mechanism that could potentially leave oil saturated in the rock. The recovery of natural gas is much less complicated because natural gas is expansive and can be produced from porous rock by allowing it to migrate by expansion into the low-pressure area around the well bore.

**Refining.** Crude oil is a complex mixture of carbon and hydrogen (hydrocarbons). In its natural state, crude oil is not worth much. “Petroleum refining is the process of separating the many compounds present in crude petroleum.” Virtual ChemBook, “Distillaton Oil Refining.” Refining separates the compounds in crude oil into gasoline, jet fuel, kerosene, diesel fuel, heating oil, and asphalt. Wikipedia, “Oil Refinery.” See Wikipedia, “Gasoline.” Thus, during the refining process, a number of different chemicals are released into the atmosphere, which pose safety and environmental concerns. Wikipedia, “Oil Refinery - Safety and Environmental Concerns.” Federal and state law requires refineries to meet stringent air and water standards. Wikipedia, “Oil Refinery - Oil Refining in the United States.”
Transportation and Distribution. In its raw state, crude oil is transported by two primary modes: tankers and pipelines. Library of Congress, “Transportation and Storage.” There are over two million miles of pipelines in the United States. Houston Museum of Natural Science, “Transportation and Distribution.” After the oil has been refined and separated from natural gas, the oil is transported by pipeline to another carrier or directly to a refinery. Petroleum products then travel from the refinery to market by tanker, truck, railroad car or more pipelines. The methods of distributing petroleum varies by weight – for example, heavy compounds like asphalt are usually transported by truck or barge. On the other hand, natural gas is transported only by pipeline, unless it’s in a liquefied state.

In The Pipeline Cases, 234 U.S. 548 (1914), the Supreme Court held that federal law could regulate pipelines, even if they were only intrastate pipelines. The Natural Gas Act of 1938, 15 USC § 717, was the first instance of direct federal regulation of the natural gas industry. U.S. EIA, “Natural Gas Act of 1938.” The Act was passed in recognition of the monopoly power of interstate gas pipelines.

3.1.1 Long-Term Price of Oil

The price of oil has fluctuated in the last 60 years. In the United States, these fluctuations have precipitated much of the legislation and regulations enacted by both the states and the federal government. The graph:

![Crude Oil Prices chart](chart_image)

Chart: WTRG Economics
3.2 Early History of Petroleum

3.2.1 Oil before Petroleum

Before petroleum was discovered, most people relied on candles and fireplaces for their energy needs, and wealthy people often used animal and vegetable fats to burn in their oil lamps. The premium fuel was whale oil, although that became increasingly more expensive as whalers destroyed the whale populations in the Atlantic and had to move to the Antarctic to find more. See Oil History, “Whale Oil.”

The story of whaling illustrates the “tragedy of the commons,” a situation in which a shared resource (in this case, whales) is depleted by individuals who, while acting according to their short-term self interest, exhaust the resource to the detriment of their long-term interest. Wikipedia, “Tragedy of the Commons.” For individual 19th century whalers, there was no short-term incentive to hunt fewer whales because individual forbearance would only leave more whales in the ocean for competitors. The situation is “tragic” because even when individuals know their actions will deplete the resource, they are unable to change their behavior. See THG Energy Solutions, “The Tragedy of the Commons.”

When did whaling end? Whaling died out when coal power and kerosene became available. The transition began in the 1850s, with the discovery of kerosene by Abraham Gesner, a Canadian inventor. See Wikipedia, “Abraham Pingo Gesner.” Gesner extracted the liquid from natural deposits of tar and asphalts, and used it to burn in the already existing oil lamps. New kerosene lamps replaced oil lamps in the homes and offices of wealthy Americans. The discovery of kerosene kindled interest in the properties hidden in the then-enigmatic substance, oil.

It wasn’t until 1859 that Americans learned how to drill for oil, rather than taking it from natural springs or skimming it from the tops of ponds. The story of oil begins with the Pennsylvania Rock Oil Company, which hired Edwin Drake to drill a well near an old oil spring. See Wikipedia, “Edwin Drake.” Drake used an old steam engine and an iron bit to drill for the oil, which he hit at only 69 feet below the surface. People rushed to Pennsylvania to drill for oil, and in 1861, the first refinery went into the region, producing mostly kerosene. See Petroleum Education, "History of Oil."

3.2.2 “Rule of Capture”

As we have seen in our study of coal, US law generally gives ownership of underground resources (be it gold, coal or oil) to the owner of the land. In the case of oil, US courts discovered that enforcing these property rights was difficult. Resources like oil and gas move easily under the earth’s surface. Whenever two or more parties own the land surface over a single reservoir, the ownership of the gas or oil is subject to constant changes in ownership. Richard J. Pierce, Jr., State Regulation of Natural Gas in a Federally Deregulated Market: The Tragedy of the Commons Revisited, 73 Cornell L. Rev. 15 (1987). Extraction of oil and gas by any one owner will causes migration, or drainage, of the resource to that owner’s property from the property of all other owners. Most oil and gas reservoirs are owned by many diverse parties, which can give rise to a variety of ownership disputes.

To minimize ownership disputes arising from oil and gas extraction, courts in England invented and applied the Rule of Capture. The rule states that a resource belongs to the first person to
extract it from the ground regardless of whether the resource at one point was located under the surface of another party’s land. Wikipedia, “Rule of Capture.” U.S. courts first applied the Rule of Capture with respect to oil and gas in 1907. Barnard v. Monangahela Natural Gas Co., 216 Pa. 362 (1907). At issue in Barnard was whether a landowner could drill a well on his farm, close to the land of another, and extract gas or oil from below the land of the adjoining landowner. The Pennsylvania court held every landowner has the right to drill wherever he sees fit and has no duty to adjoining landowners. The court recognized this may not be the best rule, but decided it could do no better. Thus, a landowner when he drills on his own property is permitted to take the gas or oil that may have lied under the land of adjoining landowners.

3.2.3 Waste Resulting from Rule of Capture

In a perfectly efficient market, the owner and producer of a resource bear all of the costs associated with production and should receive all of the benefits of production. Richard J. Pierce, Jr., State Regulation of Natural Gas in a Federally Deregulated Market: The Tragedy of the Commons Revisited, 73 Cornell L. Rev. 15 (1987). In the case of limited resources, like oil and gas, one of the costs associated with production is “discounted present value of revenues from foregone future production.” If a single party owns the reservoir, these future costs are born by the single owner and the owner has an incentive to conserve the oil; however, if more than one owner has claim to the entire oil or gas reservoir via the Rule of Capture, then the costs normally associated with production are dramatically altered. Id. Any incentive that an owner would have to conserve oil and gas is dramatically reduced because the owners are aware that any amount of oil or gas that is conserved today is likely to be produced and sold by one of the other owner-producers.

As a result, in the early 20th century, oil drillers rushed to capture as much oil as quickly as possible with rapid and uncontrolled production. Wells were built nearly on top of each other to maximize the investors’ short term profits. For example, in Spindletop, Texas (pictured to the right) less than 5% of the oil was collected because of the reckless and hasty drilling encouraged by the Rule of Capture.

Spindletop, Texas 1903.
3.2.4 Judicial Limits on Rule of Capture

Beginning in the mid-20th century, courts began to limit the Rule of Capture when a landowner wastes or destroys the gas or oil of another. In Elliff v. Texon Drilling Co. 146 Tex. 575 (Tex. 1948), the Elliffs owned adjoining land where Texon Drilling Company was operating an oil drilling rig. When the Texon rig blew out, it caused the wells on the Elliffs’ land to also blow out. The first blowout caused a large quantity of the Elliff’s gas and oil to drain from under their land and escape into the air. The Supreme Court of Texas recognized that under the Rule of Capture, there is no liability for any reasonable and legitimate drainage of oil and gas. But the court found Texon’s actions to be those of “negligent waste and destruction.” Thus, the Elliffs retained their right to their oil and gas under the Rule of Capture, a right Texon could not interfere with. Texon was held liable for the loss of the Elliffs’ oil and gas.

3.3 State Conservation Regulation

3.3.1 Preventing Physical Waste

Merely imposing liability for the negligent waste or destruction of oil and gas reservoirs was not enough to cure the underlying problem -- namely, the incentives created by the Rule of Capture. Because the Rule of Capture led to haphazard oil and gas development, often wasting large amounts of petroleum in the process, many states sought attempt to prevent this waste through “conservation regulation.”

One example of such regulation -- at issue in Ohio Oil Co. v. Indiana, 117 US 190 (1900) -- was an 1893 Indiana statute that required the operator of any oil or gas well to confine the flow of oil or gas into a pipeline or other safe receptacle within two days of discovery. Ohio Oil Company owned five oil and gas wells, and the company flared casing head gas produced by the wells because the gas had no value to the company. Nearby cities that used gas from the fields complained that Ohio Oil’s flaring was destroying the “back pressure” in the field that prevented salt water from encroaching the oil wells. The cities sued alleging violation of the Indiana statute. Ohio Oil challenged the statute as a violation of due process, arguing that it was impossible to produce oil without producing gas, and the gas had no value to the nearby city populations. Reasoning that “a single owner could use the unrestrained license to waste the entire contents of [a] reservoir” if the Court found that such regulation were beyond the power of the legislature, the Supreme Court held it was within the legislative power to prevent waste. Ohio Oil Co. v. Indiana was one of the earliest cases to recognize the doctrine of correlative rights, which holds that each owner of a common source of supply has both legal rights and duties as to the other owners.

Why did correlative rights arise? Correlative rights arose because conditioning ownership of oil and gas on capture leads to undesirable outcomes where “an owner may be able to capture a quantity of oil and gas grossly disproportionate to its ownership interest in the common pool by draining oil and gas under its neighbors’ property.” Richard J. Pierce, Jr., State Regulation of Natural Gas in a Federally Deregulated Market: The Tragedy of the Commons Revisited, 73 Cornell L. Rev. 15, 22 (1987). In response to the threat that an owner can potentially “steal” gas from other owners through uncompensated drainage, every producing state has recognized the concept of correlative rights. This provides a legal framework where each owner of oil and gas
can produce its fair share of the total oil and gas in the reservoir proportionate to its relative ownership of the reservoir.

3.3.2 Preventing Economic Waste with Market Demand Prorationing

Regulations like the one involved in *Ohio Oil Co. v. Indiana*, as well as other types of regulations, such as well spacing rules, did not address the field’s production rate, which is the most important factor affecting the ultimate percentage of oil recovered from a field. Production, in turn, affects oil prices, which can fluctuate wildly if the market is left unregulated and oil and gas rights are contingent upon the Rule of Capture to determine ownership interests. For example, the price of oil dropped from $3 a barrel in 1920 to ten cents a barrel in the early 1930s. Some operators imposed voluntary production controls on themselves, such as moratoria on new drilling until pipeline capacity and storage facilities could handle increased flows. However, the same “tragedy of the commons” plagued the industry, as some operators cheated and failed to abide by voluntary restrictions.

In response to lobbying by oil and gas operators, state legislators enacted production controls (called prorationing statutes) that established a maximum amount each well could produce. These statutes were challenged in *Champlin Refining Co. v. Corporation Commission of Oklahoma* (US 1932). Champlin was a vertically integrated oil and gas company that produced, refined and transported crude oil. Champlin alleged that prorationing orders under Oklahoma’s statute violated the due process and equal protection clauses of the Fourteenth Amendment because it interfered with the company’s property rights. After reviewing the reason for the regulation—to prevent large amounts of waste—the Supreme Court reasoned that since the proration orders were only regulated *production* and none of the proration orders were intended to, or had the effect of, fixing prices, Champlin had not proved that the regulation was invalid.

Although prorationing statutes have been upheld, almost all domestic oil wells since 1973 have produced at capacity. This is because the United States has imported a substantial amount of oil and therefore there has not been a demand for oil to be produced at rates that would create the waste the statutes were aimed at preventing. In addition, the oil and gas industry has voluntarily taken it upon itself to impose strict self-regulation. Formed in 1935 to forestall federal intervention, the Interstate Compact to Conserve Oil and Gas relies on voluntary agreements to conserve oil and gas by the prevention of physical waste. See *Interstate Compact to Conserve Oil and Gas*. The compact currently has thirty member states and six associate members.

3.3.3 Secondary Recovery: More “Tragedy of the Commons”

Secondary recovery involves injecting water or gas under pressure into the pore spaces of reservoir rock to recover oil from a well after natural reservoir drive is depleted. See *The Lease Pumper’s Handbook, “Enhancing Oil Recovery – Secondary Recovery.”* Although there are many problems with water and gas as drive mechanisms — including that toxic chemical surfactants and polymers are sometimes added to better flush oil from the rock -- they contribute greatly to enhanced recovery of oil, with the capability to double the amount of oil produced from the reservoir during the life of the well. *The Lease Pumper’s Handbook, “Enhancing Oil Recovery – Secondary Recovery.”* In 1979, for example, secondary recovery accounted for about 60% of Texas’s oil production and 38% of Oklahoma’s.
How much additional oil is recovered through secondary recovery? During primary recovery, roughly 25-29% of the “down well” oil is usually recovered. In a secondary phase, another 20% or so can be recovered. See The Nexial Institute, “Oil Recovery.” In addition, pressure maintenance projects also result in more recovery than obtained by primary methods.

The potential benefits from secondary recovery again are threatened by the Rule of Capture. When one owner uses secondary recovery, the neighboring owners may also reap the benefits of that system in their own extraction. Why should any owner that shares a reserve undertake the costs of secondary recovery when the other owners also receive the benefits, without bearing any of the costs? The Texas Supreme Court addressed this issue in Railroad Commission of Texas v. Manziel (Tex. 1962). An oil producer, Whelan applied to the Railroad Commission for permission to waterflood its part of the field, but Manziel, a neighboring producer in the same field, did not join in the operation. The commission approved and for years Manziel benefitted from Whelan’s efforts.

To stop the flow of oil to Manziel from Whelan’s tract, Whelan sought permission to place an injection well near the lease line. The commission approved. The Texas Supreme Court ultimately upheld the commission’s decision because the Manziel tract had been draining oil from the Whelan tract for years and the placement of the injection well would allow Whelan to get its “fair share” of the oil in the field. The court reasoned that secondary recovery was in the public interest and should be encouraged, and that the rules about surface invasions are not appropriately applied to subsurface invasions. The court concluded that if the commission authorizes a secondary recovery within its jurisdiction to prevent waste or protect correlative rights, then a trespass does not occur when the injected material moves across lease lines.

3.3.4 Unitization: Overcoming the Tragedy of the Commons

“Unitization is the unit-based operation of an oil pool by consolidating or merging the entire field or a substantial part of it as a single entity and designating one or more of the parties as operator.” US Legal, “Pooling, Unitization, and Joint Leases.” A unitization agreement between all of the owners of a common field binds all the parties to develop the field cooperatively for the good of all. The idea is for all owners to receive a “fair share” of the production of the entire field, and allow the field to be efficiently operated. The difficulty is finding a formula on which all of the owners of a field will agree. To address this difficulty, most oil and gas states have enacted unitization statutes that give a state conservation commission authority to force a minority of owners into a unit agreement by a majority of owners.

The necessity of compulsory unitization authority is illustrated by Gilmore v. Oil and Gas Conservation Commission (Wyo. 1982). In Gilmore, the oil field in question had 177 producing wells and was owned by more than 80 individuals or entities. When the reservoir pressure fell below the bubble point, the commission recommended that the field be unitized to prevent waste. The owners met and considered 71 different formulae for allocating the production. Wyoming’s compulsory unitization statute generally required 80% approval from the owners but in certain circumstances allowed the Wyoming Oil and Gas Conservation Commission to reduce the minimum percentage approval to 75%. By examining the voting records, the owners came to a compromise that received 75.89% approval. Gilmore, one of the owners, objected to this formula because it shorted his acreage and was based on production in the last 6 months, during which his wells had experienced downtime. Regardless, the Commission approved of the
unitization plan based on the formula and reduced the required approval from 80 to 75%. The Wyoming court acknowledged the inherent difficulties of finding a formula that would satisfy every owner and concluded that “substantial waste cannot be countenanced by a slavish devotion to correlative rights.” The court stated further that there was “no indication that a more equitable formula could be devised” and upheld the Commission’s decision.

Most states have compulsory unitization statutes that allow the state’s conservation agency to force holdouts into a unit that will increase the total recovery from the field. Texas, the largest oil producing state, however, has not passed a unitization statute. As a result, many independent operators in Texas receive more than their fair share of a reservoir’s production under Texas’ prorationing and drilling permit system. To address this, the Texas Railroad Commission has forced operators to “voluntarily” unitize a substantial number of the largest oil fields in the state by threatening to shut in the fields or prorate them severely under the Commission’s broad authority to prevent waste.

Below is a graph showing the history of U.S. domestic oil production. You’ll notice that secondary recovery efforts peaked in 1970 and began a slow downward trend over the next 40 years – until the spike of oil production from “hydraulic fracturing” changed the picture in the 2010s.

Since 2010, the production of oil from shale through hydraulic fracturing has led to a dramatic surge in US oil production. Specifically, the Bakken Shale, located primarily in North Dakota, has led to a dramatic increase in U.S. oil production. North Dakota, now the second-largest oil producing state, provides nearly one out of every eight barrels of oil produced in the United States.

### 3.3.5 Hydraulic Fracturing
Rule of Capture Reigns Again. Hydraulic Fracturing, more commonly known as “fracking”, is a well stimulation process that aids in the extraction of oil, natural gas, geothermal energy, and water. Fracking was first used commercially by Halliburton in 1943, but has become commercially viable only in the last 10 years. Electric Tree House, “Notes on the History of Fracking.”

Hydraulic fracturing involves drilling a vertical well several hundred or thousand feet. EPA, Hydraulic Fracturing Background Information. This vertical well is cased with several layers of concrete to protect against contamination while drilling through underground water tables. Then a process of horizontal drilling begins to extend the well several hundreds or thousands of feet in any direction. After the horizontal well is created, perforations are made into the rock bed along the horizontal well. Fluids are then shot down at high pressure through the well and they surge into the rock bed creating fractures in the rock at the perforations.

The fluid used in hydraulic fracturing is unique to each company, but is commonly made up of water and chemical additives. When the fluid pressure exceeds the rock strength, fractures are created that can extend several hundred feet away from the well. Then a propping agent is pumped into the fractures to keep them from closing when the pumping pressure is released (see image below). Once the fracturing pressure is removed, the pressure inside of the geologic formation causes the oil and gas (along with injected fracturing fluids) to rise to the surface. The oil and gas is separated from the fracturing fluids. The recovered fracturing fluids – known as flowback – are disposed if by being discharged into surface water, sent to water treatment plants, or injected underground.

Hydraulic fracturing allows for drilling companies to reach oil and natural gas previously unreachable because it was trapped in impermeable rock formations that did not allow the resources to pool naturally. It has led to a modern day “shale rush,” and the extraction of shale
oil and natural gas by hydraulic fracturing is one of the fastest growing trends in American onshore domestic oil and gas production.

What are the property rights of landowners to oil produced through hydraulic fracturing? Notice that the horizontal portion of a “fracked” well might extend for more than a mile, well beyond the limits of the operator’s lease on a landowner’s tract. Hydraulic fracturing raises a clear issue of trespass.

Nonetheless, state courts have applied the Rule of Capture to allow production from “fracked” wells that extend horizontally under adjoining landowners’ property. In *Coastal Oil and Gas Corp. v. Garza Energy Trust* (Tex. 2008), the Texas supreme court ruled that the Rule of Capture applied in this setting. The court reversed a jury award for $1 million to the Salinas family after Coastal extended its fracking operation onto property owned by the Salinas, thus depriving them of their royalties. Rejecting the Salinas’ argument that the Rule of Capture does not apply to fracking because it is unnatural, the court reasoned that fracking is no more unnatural than drilling wells. The court stated that the “law affords…ample relief” because Salinas could use hydraulic fracturing to stimulate production of their own wells and drain the gas to their own property.

The *Garza Energy* court listed four reasons for not altering the Rule of Capture with respect to fracking: (1) the law affords the owner full recourse in the form of allowing an owner to drill a well to offset the drainage from his property, (2) allowing recovery in these situations would usurp the authority of the Railroad Commission to regulate oil and gas production, (3) the litigation process is not equipped to handle determining the value of oil and gas drained by fracking, and (4) no one in the oil and gas industry wants or needs the Rule of Capture to be changed.

**Hydraulic Fracturing: Environmental Concerns.** What are the environmental concerns with fracking? Most significant has been the potential of contamination from fracturing fluids, “a mixture of 596 chemicals, many of them proprietary, and millions of gallons of water per frack.” *GASLAND, “Hydraulic Fracking FAQ’s.”* Fracking thus poses a threat to the safety and cleanliness of nearby water supplies. Despite this potential pollution, a provision in the 2005 Energy Policy Act – sometimes known as the Halliburton loophole” -- stripped the Environmental Protection Agency (EPA) of its authority to regulate fracking. *The New York Times, “The Halliburton Loophole.”* The loophole exempted natural gas drilling from the Safe Drinking Water Act (SDWA), thus exempting companies from disclosing the chemicals used during fracking. *GASLAND, “Hydraulic Fracking FAQ’s.”; See 42 USC § 300f et seq.*
In 2009, a bill was introduced in Congress -- the Fracturing Responsibility and Awareness of Chemicals Act (the FRAC Act) -- to repeal the SWDA exemptions for fracking. GovTrack, S.1215; GovTrack, H.R.2766. The FRAC Act would have closed the Halliburton loophole by requiring the oil and gas industry to disclose the chemicals used in fracking, and restoring authority to the EPA to regulate fracking. The New York Times, “The Halliburton Loophole.” After the 2009 bill died, it was reintroduced in March 2011 and again in June 2013. (GovTrack, S.587; GovTrack, H.R.1084) The bill has been given a 9% chance of getting past committee and a 1% chance of being enacted. Thus, fracking regulation has fallen on the states to devise their own plans. See Chapter 5, Natural Gas.

3.4 Offshore Oil and Gas

A considerable portion of the United States’ undiscovered oil and gas reserves lie in an area located just off our nation’s coast known as the continental margin or the outer continental shelf (“OCS”). The U.S. OCS has been divided into four leasing regions: Gulf of Mexico, Atlantic, Pacific and Alaska. Wikipedia, “Outer Continental Shelf.”

The OCS, estimated to be over 100 billion acres, is part of the internationally recognized continental shelf of the United States, which does not fall under the jurisdictions of the individual states. Wikipedia, “Outer Continental Shelf.” By statute, the OCS consists of the submerged lands, subsoil, and seabed lying between the seaward boundary of each states’ jurisdiction and the seaward extent of Federal jurisdiction. See 43 USC § 1331. In 2007, approximately 27% of U.S. oil production and 14% of natural gas production came from wells located in the OCS, mostly in areas of the Gulf of Mexico and off the coast of California.
The question about whether to harvest these reserves has always been a political one. The Gulf States are divided on the issue, with states on the western coast of the Gulf open to OCS leasing, but states on the eastern coast, like Florida, strongly opposed to any drilling. Likewise, coastal states such as California and Massachusetts have not been welcoming to offshore drilling. In a similar vein, drilling off the coast of Alaska has provided its own unique set of problems.

Next we look at the offshore drilling process, then discuss the statutory framework that governs offshore drilling, consider the unique problems posed by mining Alaska’s oil and natural gas reserves, and finally examine the moratoria currently in place on offshore drilling.

3.4.1 Offshore Drilling Process

Offshore drilling refers to the mechanical process where a wellbore is drilled through the seabed to explore for and produce hydrocarbons which lie the in the rock formations beneath the seabed. See Wikipedia, “Offshore Drilling.” The first submerged oil wells were drilled in 1891 from platforms in the fresh waters of Grand Lake St. Mary’s in Ohio and the first salt water oil well appeared in 1887 off the coast of California in the Santa Barbara Channel at a depth of about 300 feet. NOIA, “History of Offshore.” Today, oil exploration is going to depths never before imagined. In 2011, Shell set a world record for the deepest oil and gas well in the world with the Perdido development in the Gulf of Mexico, which sits 9,672 feet below the water’s surface. See Shell, “Shell Sets World Record.”

While the technology of oil rigs is constantly improving to increase efficiency, there are seven main types of oil rigs employed today. See MMN, “Types of Offshore Oil Rigs.”

**Fixed Platform:** Anchored directly to the ground, these rigs feature a steel structure known as a “jacket” that rises up from the ocean floor to support the surface deck. Fixed platforms offers stability and are able to drill up to depths of 1,500 feet, but this type of rig offers no mobility and is very expensive to build. Because of these issues, this type often is used to tap shallow wells with long-term potential to justify the cost. MMN, “Types of Offshore Oil Rigs.”

**Jack-Up Rig:** For smaller oil deposits that are still in shallow waters, companies often opt for a “jack-up” rig, which is towed to the deposit by a barge and has extendable legs that extend down
to the seafloor and raise the rig above the water’s surface. Jack-up rigs are considered safer than other systems because their legs make them less susceptible to waves and weather, however, the cost of extending the legs limits their application to shallow deposits, usually around 300 feet. MMN, “Types of Offshore Oil Rigs.”

Compliant Tower: Similar to fixed platforms, a compliant tower is anchored to the seabed and has most of the equipment above the water’s surface, however, this type of structure is taller and narrower than a fixed platform and sways with waves and weather as if it were floating. This swaying is because their jackets are broken into two sections, a lower section acting as a base and upper section holding the surface facilities, which allows the rig to much greater depths, up to 3,000 feet below the water’s surface. MMN, “Types of Offshore Oil Rigs.”

Floating Production System: In order to reach deeper wells, oil companies have embraced rigs that float partly above the water’s surface while pumping oil. Some use wires to connect to a stabilizing anchor, while others are “dynamically positioned,” using computer-controlled thrusters to maintain their position. These rigs are the most common type used in the Gulf of Mexico, able to reach depths of 6,000 feet. Because the wellhead is on the sea floor instead of the platform, a machine known as a “blowout preventer” is employed to prevent leaks. MMN, “Types of Offshore Oil Rigs.”

Tension-Leg System: Capable of drilling over a mile deep, a tension-leg system consists of a floating surface structure held in place by a taut, vertical “tendons” connected to the seafloor. A smaller version known as a “Seastar” is often employed as a low-cost solution for small shallow water deposits that do not justify a greater investment. Seastar rigs are capable of reaching depths of 3,500 feet. MMN, “Types of Offshore Oil Rigs.”

Subsea System: Subsea wellsystems extract oil directly from the wellhead at the seabed, with a production module that rests directly on the sea floor and transfers the oil to surface facilities via risers or pipers. The surface facilities may be located on a platform rig, a nearby ship, a production hub, or even distant onshore facilities. Because of the versatility of this type of system, oil companies have multiple options for tapping hard-to-reach deposits, but this type of well may present serious complications if the well begins to leak. MMN, “Types of Offshore Oil Rigs.”

Spar Platform: named after the vertical “spar” (aka mast) of a sailing ship, spar-platform rigs use a single wide-diameter cylinder to support a surface deck from the sea floor. A typical platform in the Gulf of Mexico has a 130-foot wide cylinder with roughly 90% of the structure being underwater. Cylinders are available at depths of 3,000 feet, but existing technology can extend this to about 10,000 feet, making this type of rig most useful for ultra-deepwater deposits. MMN, “Types of Offshore Oil Rigs.”

3.4.3 Statutory Framework

Federal regulation of the OCS dates back to 1945 when President Truman signed a proclamation, “Policy of the United States with respect to the Natural Resources of the Subsoil and Sea Bed of the Continental Shelf.” See Proclamation 2667. This proclamation was given life in 1953 by the Submerged Lands Act (“SLA”), 43 U.S.C. §§ 1301-1305, and the Outer Continental Shelf Lands Acts (“OCSLA”), 43 U.S.C. §§ 1331-1356. For jurisdictional purposes, the SLA confined state
jurisdiction of submerged lands to an area extending up to three mils beyond the low-water mark along the coast. See 43 U.S.C. § 1301(b). The OCSLA further defined the outer continental shelf as all submerged lands lying seaward of the area of land subject to state jurisdiction. See 43 U.S.C. 1331(a). Thus, the two pieces of legislation gave the federal government control of all submerged lands three miles of the coast to the boundary recognized by international law.

Almost all modern legislation governing offshore drilling for oil and natural gas can be traced backed to a singular event: the Santa Barbara oil spill of January 1963. See Wikipedia, “1969 Santa Barbara Oil Spill.” In that case, an oil rig being drilled by Union Oil Company blew out and leaked between 24,000 and 71,000 barrels of oil over the span of 11 days. In response to this incident, Congress rapidly enacted a succession of environmental acts:

- Marine Protection Research and Sanctuaries Act of 1972, 33 USC § 1401 et seq.
- Coastal Zone Management Act of 1972 (CZMA), 16 USC § 1451 et seq.
- extensive amendments (in 1977) to Clean Water and Clean Air Acts, 33 USC § 1251 et seq.; 42 USC § 7401 et seq.,
- revision (in 1978) of the Outer Continental Shelf Lands Act of 1953 (OCSLA), 43 USC § 1331 et seq.

At the heart of the OCSLA and its amendments is the leasing system for offshore exploration and development rights, a complex and lengthy process that aims to balance several interests, which includes economics and environmental concerns. The process calls for information and nominations of potential producers, identification of areas to be explored, and a final draft of environmental impact statements. Following this, the Secretary of the Interior is authorized to use a wide-range of bidding systems to sell the lease, including systems that involve cash payments, royalties, or both. These royalty payments are governed by the Federal Oil and Gas Management Act of 1982, 30 U.S.C. §§ 1701 et seq., and considering the value of the resources involved, the royalty payments to the United States Treasury is often billions of dollars annually.

The legislative enactments in response to environmental concerns came at a time when the country was in the throes of an energy crisis brought on by the OAPEC oil embargo of 1973. Thus, the last part of the decade saw energy competing with the environment for national attention. The revision of the OCSLA 1978 and the CZMA in 1972 was a compromise with the environmental lobby. The amendments expanded the role of state and local government officials in the federal OCS leasing process in hopes that this would put an end to litigation between costal states and the federal government, so that oil could be expedited to markets in the wake of the price shocks caused by the embargo. After these amendments, the development of an offshore oil well requires four distinct stages: (1) formulation of a five year leasing plan by the Department of the Interior; (2) lease sales; (3) exploration by the lessees; and (4) development and production. Each stage involves its own separate regulatory review. See Secretary of the Interior v. California 646 U.S. 312 (1984).
However, opposition to OCS leasing continued unabated. In 1977, the Department of Interior (DOI) was prepared to issue another lease sale off the coast of Santa Barbara, which the State of California opposed. The state government asked the U.S. Supreme Court to interpret the CZMA and the amended OCSLA in light of this leasing decision. See Secretary of the Interior v. California 646 U.S. 312 (1984). The case hinged on language in the CZMA that stated activities that “directly affected” a coastal zone must comply with state standards. The state argued that the plain meaning of the phrase meant “initiating a series of events of coastal management consequence” because the lease would ultimately lead to oil and gas development, which “directly affects” the California coast zone. The DOI offered a different plain meaning of the phrase, arguing it only meant “having a direct, identifiable impact on the coastal zone” and did not apply to leasing because this did not have such an impact. Using the intent of Congress in enacting the OCSLA and the CZMA, the Court held that the language was only intended to apply in the last two stages of well development, but did not apply to the DOI’s leasing system. See Secretary of the Interior v. California (US 1984).

Congress amended the CZMA in 1999 to remove “directly” from the statutory language, thus lowering the burden for states wishing to prevent offshore drilling. See 16 USC § 1456(c)(1)(A). States have been emboldened to challenge lease sales, encouraged by the Ninth Circuit. See California v. Norton (9th Cir. 2001). In this case, the Ninth Circuit relied on the new language in the amendment, as well as legislative history, to find that Congress amended the statute to “overturn the decision of the Supreme Court in Secretary of the Interior v. California, and to make it clear that… oil and gas lease sales are subject to… section 307(c)(1).” The question of state involvement in OCS oil and gas leasing has not yet been revisited by the Supreme Court.

3.4.3 Alaska

With the country looking for new sources of oil to “end dependence on foreign oil”, there was in the 1970s a push for opening new areas to exploration. The push continues. See N.Y. Times, U.S. to Open New Areas to Offshore Drilling. It is estimated that the Artic could contain up to 22% of the world’s undiscovered oil and gas reserves. In a 2011 report prepared for Shell Exploration and Production, it was estimated that exploration and development of the Beaufort and Chukchi Seas in Alaska could yield as much as 10 billion barrels of oil and 15 trillion cubic feet of natural gas through the year 2057. If the estimates are accurate, Alaska would turn into the eighth largest oil resource province in the world, ahead of Nigeria, Libya, Russia, and Norway. See Potential National-Level Benefits of Alaska OCS Development.

With such a vast reserve, it is important to examine the unique issues that surround development of the region, specifically legal concerns with the local native Alaskans, environmental concerns, and how Alaska oil might be transported to the lower 48 states.

Aboriginal rights. Alaska’s Prudhoe Bay, the largest oil field in North America, was discovered in 1967 on land that the state had selected under the Alaskan Statehood Act of 1958. Wikipedia, “Prudhoe Bay Oil Field.” The Act had given Alaska the right to select over 100 million acres from unreserved lands. See Alaska Statehood Act. Native Americans in Alaska objected to many of the state’s selections under the act and, by 1968, had filed land claims for 80% of Alaska. Congress resolved these disputes with the Alaskan Native Claims Settlement Act of 1971 (ANCSA), which allowed the natives to select 44 million acres of land, so long as they
agreed to relinquish all aboriginal rights to the exclusive use of the land and waters. See 43 USC § 1601 et seq.

“Aboriginal rights”, the rights of the natives to hunt and fish for subsistence, was a theory long recognized by both Alaskans and the U.S. Courts. These rights were extremely important for the native Alaskans as most lived a subsistence life-style based on harvesting wild resources. The Settlement Act did not vest native Alaskans with the right to fish or hunt in the large part of Alaska that was now in federal hands. However, the federal government remedied this problem by the passing the Alaska National Interest Lands Conservation Act (“ANILCA”) 9 years later, which established a priority for non-wasteful subsistence fishing and hunting on federal lands. See 16 U.S.C. § 3120.

Outer Continental Shelf (OCS) leasing began to come into conflict with the subsistence rights of native Alaskans living in coastal villages. This conflict came before the Supreme Court in Amoco Production Co. v. Village of Gambell (US 1987). The native Alaskans claimed that OCS leasing would adversely affect their aboriginal rights to hunt and fish on the OCS under ANILCA. However, the Supreme Court disagreed, overturning the Ninth Circuit’s construction of the ANCSA phrase “in Alaska” to mean “the geographic region and the waters above it, not merely the area within the strict legal boundaries of the State of Alaska.” People of Gambell v. Clark (US 1984). The Supreme Court held instead that ANILCA did not apply to OCS leasing activity because “in Alaska” only included waters up to the three mile territory line and the OCS leasing commenced well past these territorial waters. Interestingly, before the Supreme Court’s decision, the Secretary of the Interior had sought to comply with the decision of the Ninth Circuit and examined the potential impact of the Lease Sale. The evaluation found that limited activity on the OCS did not significantly restrict subsistence uses, but extended exploration and development could restrict such uses for “limited periods in limited areas” if a major spill occurred.

Environmental concerns. Another issue lurking with off-shore drilling in Alaska is the probable environmental impact of the exploration and development of the region’s oil reserves. Between 2005 and 2008, Shell Oil paid $2.2 billion for substantial leases to areas in the Chukchi and Beaufort Seas. These leases raise questions about the adequacy of the Environmental Impact Studies, the polar bear’s endangered status, native rights, the risk of irreversible oil spills, and global warming. See Alaskan OCS Leasing Strategy. In a challenge of the leases, the D.C. Circuit concluded that the DOI’s environmental sensitivity rankings were irrational and the agency could not have properly balanced environmental and economic interests. The court remanded the leasing program to the DOI for further consideration. See also Center for Biological Diversity v. Dep’t of Interior (US 2009).

In 2012 DOI allowed Shell to begin preparatory work in the Chukchi Sea for its first well in the Arctic Ocean. See BSEE Authorization for Shell. A series of setbacks led the company to delay the project until 2013. See Shell: Won’t hit oil in Alaska this year. While many environmental groups are hailing this as a victory, most recognize that the fragile Arctic region is still at risk and have begun launching campaigns to prevent oil drilling in the region. See Greenpeace: Save the Arctic.

Pipeline from Alaska. In 2004, during the Bush administration, Congress enacted the Alaska Natural Gas Pipeline Act. 15 USC § 720. The bill authorized a federal loan guarantee to private
investors to construct the pipeline from Alaska to Chicago, which would take about ten years to permit and build. The purpose of the ANGPA is to promote the multibillion-dollar Alaska natural gas pipeline to deliver North Slope gas to consumers in the 48 contiguous states. Wikipedia, "Office of the Federal Coordinator, Alaska Natural Gas Transportation Projects." Since 2004, the price of the pipeline from the North Slope to Chicago has ballooned to about $40 billion, twice its initial estimate.

3.4.4 Moratoria and Withdrawals of Land From Leasing

A moratorium movement, prohibiting OCS leasing, began gaining momentum under Ronald Reagan’s administration in 1981. A moratorium is an injunction issued by either the Executive or Congressional branch to delay or suspend an activity. The movement began at the insistence of the coastal states that were frustrated with the results of litigations aimed at prohibiting offshore drilling. In 1982, Congress wrote a prohibition into the Department of the Interior’s (DOI) appropriation’s bill that banned offering certain OCS areas on the California coast up for lease. By 1989 succeeding appropriation bills had extended the moratoria to more than 181 million acres off the coasts of California, the North Atlantic, and the eastern Gulf of Mexico. This off limits acreage equaled more than twice the acreage that had ever been leased in the history of the OCS program.

Congress cited a planned lease of 1 billion acres in 1981 by then-Secretary of the Interior, James Watt, as the reason for the moratoria. This lease, which was to have run from 1982 to 1987, would have covered 25 times the land offered for lease from 1954 to 1980. Congress explained that the rapid pace and magnitude of the leasing proposed under the program would undermine the ability of state and local governments to adequately assess the environmental impact of leasing and to plan OCS development. Congress further stated that since the Regan administration refused to continue funding for state coastal management systems, include the states in OCS revenue sharing, or maintain consistent program requirements, the states and local citizens were left taking all the risks of OCS activity without receiving any of the benefits.

How was this moratorium received by the oil companies? As could be expected, the moratorium was met with fierce opposition by the domestic oil industry, with some even likening it to an act of war. See Understanding the Debate Over Congressionally Imposed Moratoria on Outer Continental Shelf Leasing. The Watt program led to court battles over the scheduled lease sales, with eight of the first fifteen sales challenged in court. This increased litigation led to some companies choosing to abandon high potential areas, which ultimately resulted in millions of dollars in forfeited investment. However, the 1980’s saw a sharp drop in the price of oil that crimped demand for federally leased lands and succeeding presidents did not see the need to lift the moratoria. In 1990 President George H.W. Bush extended the moratoria to most of the U.S. coastline, and in 1998 President Clinton extended this moratoria through 2012, but excepted regions in the Central and Western Gulf of Mexico and parts or Alaska. Again, the oil industry expressed its displeasure with the extension, lamenting the fact that “it ignores the near-perfect performance of the American petroleum industry in operating offshore in a safe and environmentally safe manner.” Even under George W. Bush, who strongly advocated for increased domestic oil production, the moratoria remained largely untouched with his administration instead focusing on Alaskan production, deep water drilling in the Gulf of Mexico, and increasing access to federal lands in the western United States.
Record high oil and gas prices in 2004 challenged the political position on domestic production and led to Congress authorizing an inventory of OCS oil and gas resources in order to identify and explain all laws, regulations, moratoria, leases, and processes that restrict or impede development of OCS resources. See National Energy Act of 2005, § 357. The congressional moratoria expired in 2008 because Congress did not include a leasing prohibition in the appropriations bill. President Bush, who was nearing the end of his second term, lifted the executive order restricting certain OCS leasing, which led to the development of an OCS lease program from 2010 to 2015.

How are oil and gas reserves on the OCS managed? Management of the oil and gas resources of the Outer Continental Shelf (OCS) is governed by the OCS Lands Act (OCSLA), which sets forth procedures for leasing, exploration, and development and production of those resources. The Bureau of Ocean Energy Management (BOEM), formally the Minerals Management Service (MMS), is the bureau within the DOI that is responsible for implementing the requirements of OCSLA. See BOEM, “Leasing.” Specifically, Section 18 of OCSLA calls for the preparation of an oil and gas leasing program indicating a 5-year schedule of lease sales designed to best meet the nation’s energy needs. 43 USC § 1344. In April of 2009, the DOI’s OCSLA 2007-2012 leasing program was vacated and remanded back to the Interior for revision after being challenged in the DC Circuit Court of Appeals in Center for Biological Diversity v. U.S. Dept. of Interior. Under the revised 2007-2012 program, the Secretary of the Interior included 16 sales in 6 areas of the OCS. See Revised Outer Continental Shelf Oil and Gas Leasing Program 2007-2012. The 2007-2012 program expires on June 30, 2012. In accordance with the statutory obligations under OCSLA, the Secretary is in the process of developing a new 5-year program that will govern OCS activities during the period 2012-2017. The proposed 2012-2017 program was issued in November 2011. See Proposed Outer Continental Shelf Oil & Gas Leasing Program 2012-2017. It included 15 lease sales in 6 offshore areas where there are currently active leases and exploration and where there is known or anticipated hydrocarbon potential. Twelve of the 15 leases included in the proposed program are in the Gulf of Mexico. The new program takes effect on July 1, 2012.

On August 27, 2012, Secretary of the Interior Jen Salazar gave final approval to the schedule of lease sales set out in the Proposed Final Program, which was announced and submitted to the President and Congress on June 28, 2012. See Five Year OCS Oil and Gas Leasing Program. As mentioned, this final program included increased exploration in the Chukchi and Beaufort Seas in Alaska and increased concentration in the Western and Central Gulf of Mexico. For more information regarding the development areas, see Program Area Maps. For more information regarding the specific leases, see 2012-2017 Lease Sale Schedule.

### 3.4.5 Environmental Impact of Oil

The production, transport, refining, and consumption of oil and petroleum products have a significant environmental impact. They can all affect air quality, water quality, and biological resources - either directly or indirectly - through air and water quality changes that they precipitate.

**Air quality.** Both onshore and offshore production impacts air quality with emissions from drilling equipment, escaping hydrocarbons, flaring natural gas, and vehicle emission. Further, transferring oil to pipelines, to refineries, and with tankers and barges also emits hydrocarbons.
However, the greatest impact oil has on air quality degradation is through consumption. Combustion of petroleum products yields of smog emissions, including carbon monoxide, hydrocarbons, oxidation products, and particulates. By weight, automobiles contribute nearly half of the total pollutants, but this is attributable to carbon monoxide constituting a larger proportion of the emission. The principal stationary contributors are chemical plants, iron and steel mills, petroleum refineries, pulp and paper plants, electric plants, and metal smelters.

**Water quality.** One consideration for both onshore and offshore production is the proper disposal of produced water. Produced water is the aqueous wastewater held in fossil fuel-bearing formations for thousands of years, which often leads to high concentrations of metals, hydrocarbons, and other organic substances. On average, one barrel of produced water is obtained for each barrel of crude oil recovered and is the largest source of contaminants in onshore or offshore development. Disposal of drilling muds, which usually contain clay minerals, barite, metals, sodium hydroxide, biocides, diesel fuel, can also present a problem, especially during offshore production.

Another major source of water pollution comes from oil spills and tanker discharge. On average, about 6 million tons of oil pollutants get to the ocean annually. This figure does not take into consideration potential oil spills, like the Deepwater Horizon disaster, which can cause millions of barrels of oil to be released into the open ocean. The Deepwater Horizon oil spill alone accounted for approximately 4.9 million barrels of crude oil to be released in a three month span. *See Oil Spill Commission - Final Report on Deepwater Horizon Oil Spill.* For more on oil spills, see section 3.6.1. Oil also threatens fresh water quality, with roughly 200 million gallons of used engine oil being disposed incorrectly annually. EPA, *Resource Conservation - Used Oil.* The risk of this oil contaminating clean water is great, as is the cost – one quart of improperly disposed of crankcase oil can cause 250,000 gallons of water to be unusable as fresh drinking water.

Are industrial facilities generally compliant with the CWA? Failure to comply with the stringent provisions of the CWA seems to plague major industry facilities. In 2003, an EPA report found that 25% of major industry facilities were in significant noncompliance with their CWA discharge permits, but only a few of the violators were penalized. In 2001, nearly half of the facilities violated their permit limits by 100% their allowed limit and 13% exceeded 10 times the permitted levels of toxic pollutants. The report indicated that some officials in the EPA believed that the excess pollution is due to unachievable water-quality limits, either due to technical limitations or cost.

**Biological resources.** Both plants and animals can be affected directly by petroleum development on top of any indirect effects that result from air or water pollution. While environmentalists focus on “indicator species”, such as caribou in Alaska, to showcase the effects of oil production, scientific knowledge of complex ecosystem interactions is not to the point to be able to accurately pinpoint the effect of oil production on biological resources.

**BP Exploration & Oil, Inc. v. United States EPA.** As waste from offshore oil production is generated, there are three options for its disposal: it can be (1) deposited in the ocean; (2) re-injected at the platform; or (3) shipped back to shore for burial. In an effort to govern how this disposal occurs, the EPA issued regulations governing the disposal, which was challenged by both the oil industry and environmentalists. The Sixth Circuit addressed the issue in its discussion of the Clean Water Act (CWA) and its multi-stage effluent discharge guidelines. *BP*
Exploration & Oil, Inc. v. United States EPA (6th Cir. 1995); see also EPA, “Summary of the Clean Water Act.”

The Sixth Circuit discussed the CWA and its general objective “to restore and maintain the chemical, physical, and biological integrity of the Nation’s waters.” 33 USC § 1251. Consequently, the discharge of any pollutant is illegal unless made in compliance with the provisions of the CWA. The CWA formulates national effluent limitation guidelines for those entities that discharge pollutants into the navigable waters of the United States. Under these guidelines, Congress instructed the EPA to create a multi-stage system, wherein each stage of effluent discharge (based on the type and amount of pollutant(s)) is progressively more stringent than the last. In order for the emitting entity to obtain a permit to operate, it must meet the standards set forth by the EPA. At the first stage of pollutant reduction, the EPA determines the level of effluent reduction achievable within an industry with the implementation of the “best practicable control technology currently available,” or, “BPT.” At the second stage, the EPA sets more stringent standards for toxic and conventional pollutants. For toxic pollutants, the EPA is to set the standard for the “best available technology economically achievable,” or, “BAT.” For conventional pollutants, the standard is “best conventional pollutant control technology,” or, “BCT.” For new pollutants, the EPA the standard - “new source performance standards” (NSPS) - is tantamount to the application of BAT controls to remove all types of pollutants from new sources within each category. Under the CWA, new platforms are subject to more stringent technical standards than existing sources of offshore oil production.

In BP Exploration, the EPA was challenged by two different petitioners: the oil industry and the Natural Resources Defense Council (NRDC). The former argued that the EPA’s standards were too stringent; the latter argued that the standards were too lenient. In examining the EPA’s standards for disposal of produced water and drilling mud, the court, giving due deference to the EPA and the extensive scientific research it had done on the matter, affirmed the agency’s final rule and its multi-stage standards.

3.5 Oil Spills and Transportation

3.5.1 Oil Spills

Oil spills often occur as a side effect of the transportation, refinement, and use of petroleum products. Broadly defined, oil spills include the release of crude oil from tankers, offshore platforms, drilling rigs, and wells. Wikipedia, “Oil Spill.” Spills further include the release of refined petroleum products (such as gasoline, diesel) and their by-products and heavier fuels used by large ships such as bunker fuel. Spills may take months or even years to clean up.

The Exxon Valdez Oil Spill. On March 24, 1989 the Exxon Valdez, an oil tanker bound for California, struck the Blight Reef in Prince William Sound, Alaska. Over the next few days the tanker spilled 11 million gallons of crude oil into the ocean – at the time, the largest oil spill in US history. The shipwreck and resulting environmental disaster were caused by a multitude of deficiencies, including an inebriated ship captain, a large ice floe that diverted the tanker’s course, a crew at half size, Exxon’s failure to properly maintain a collision avoidance system, and the lack of available equipment and personnel hampered the spill cleanup. As many as 250,000 seabirds, 2,800 sea otters, 250 bald eagles and numerous other wildlife died immediately after the spill. In 2014, twenty-five years later, NOAA scientists estimated that
some of the species are beginning to recover. But up to 21,000 gallons of oil remain on beaches and rocks in Prince William Sound and some up to 450 miles away.

**The BP Deepwater Horizon Oil Spill.** On April 20, 2010, the BP Deepwater Horizon drilling rig was “rocked by an explosion and fire” [BP Deepwater Horizon Oil Spill]. The result of this explosion, and the ensuing fire, was the death of eleven crewmembers and an oil well at the bottom of the sea floor that leaked for a period of 87 days. It is estimated that during that time, 4.9 million barrels of oil were released into the Gulf [BP Oil Spill Wikipedia]. This spill resulted in extensive damage to marine and wildlife habitats, including the fishing and tourism industries, and has had serious implications for human health, as well [BP Oil Spill Wikipedia]. As of July 2013, tar was still washing up on the Gulf Coast, resulting in direct economic damage to the local economy [BP Oil Spill Wikipedia].

In 2011, the U.S. government issued a report that identified “defective cement on the well” as the direct cause of this spill and laid the blame directly at the feet of BP, rig operator Transocean and contractor Halliburton [BP Oil Spill Wikipedia]. A White House Commission looking into this issue specified a “series of cost-cutting decisions and an insufficient safety system” as underlying factors in causing this incident and recommended reform in “both industry practices and government policies” in order to protect against a repeat event [BP Oil Spill Wikipedia]. The haggling over how, and how much, BP compensates for those incurring damages due to the spill is ongoing.

In 2012, BP reached an agreement whereby it would put aside an amount of money, estimated at $7.8 billion, to compensate those with economic, property or medical damages resulting from the spill. However, there exists significant controversy over just how payments from this fund should be doled out. In June 2013, attorneys for BP have warned that they will seek to verify and potentially recover from claimants some of the money the fund has paid out if its determined that businesses that received payments didn’t actually suffer losses from the spill [WSJ on BP Oil Spill Claimant Compensation]. In addition to this controversy, BP is also currently involved in a civil trial that could result in additional “environmental fines that could total as much as $17.6 billion” and footed the bill for over $25 billion in costs directly related to oil spill response, which includes cleanup and restoration costs [WSJ on BP Oil Spill Claimant Compensation]. It is anticipated that legal disputes related to the BP spill will be ongoing for many years.

As is clear from the magnitude of the financial sums involved, the BP spill is the worst, and, along with the Exxon Valdez disaster, the most memorable in U.S. history. See EPA, “Exxon Valdez”; [National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling]. However, oil spills, albeit on a lower scale, occur often as a part of delivering petroleum products to the market. Oil spills both affect market price and result in negative environmental externalities; therefore, it is in the best interest of consumer and capitalist alike to transport and refine petroleum as safely as possible. The US Coast Guard reports that since 1990, the number of spills of more than 10,000 gallons in the United States decreased by about 50%.

### 3.5.2 Remedial Legislation: OPA 90

As a result of the Exxon Valdez spill in 1989, the Oil Pollution Act of 1990 (OPA 90), [33 USC § 2701 et seq.], was passed to address future oil spills and the devastating effects that oil spills have
on the economy. See United States Coast Guard, “Oil Pollution Act of 1990 (OPA).” OPA 90 states that any oil company, meaning oil ship or oil rig, is liable for the removal costs and damages resulting from an accident where oil is spilled into the ocean, on a shoreline, or in an area that is popular for fisheries. 33 USC § 2702(a). In addition, OPA 90 required all tank barges to have double hulls and for all single hull tank barges, if not retrofitted, to be phased out before 2010. It was the first federal statute to establish corporate liability for damages to natural resources and injuries, as well as loss of income for people who fish those areas.

OPA has faced legal challenges. In 2003, the marine transport petroleum company Maritrans claimed that OPA’s double-hull requirement constituted a regulatory taking because the company’s single hull fleet (with an expected 60-year lifespan) would become worthless beginning in 2010. Maritrans, Inc. v. U.S., 342 F.3d 1344 (Fed. Cir. 2003). The court agreed with Maritans that it had a cognizable property interest, but rejected that it was either a categorical or regulatory taking. The court held that the company’s oil barges still maintained some value by being in operation until 2010 (not a categorical taking) and that the requirement did not prohibit them from doing business completely (not a regulatory taking.) Therefore, that aspect of OPA 90 was upheld.

When the bill was originally written, OPA capped liability for oil spills at $75 million – unless the spill was the result of “gross negligence.” After the BP oil spill in 2010 in the Gulf of Mexico, some members of Congress attempted to raise the liability cap to $10 billion. See GPO, H.R. 5214. But the proposal was resisted by both political parties, given that there are other wells in that area that need to be protected -- at least, economically.

3.6.3 Oil Pipeline Safety

Oil and gas pipelines are controlled by continuous, but remote, sensing units that monitor the flow and pressure of the pipeline. These devices, however, can usually only detect releases after they occur. Thus, prevention is the most important aspect of pipeline safety. Corrosion is the most common reason for pipeline rupture. The use of “smart pigs” (instruments placed inside pipes to detect corrosion) do not work well in older pipes and require skilled engineers to interpret the data. Instead, operators must excavate portions of pipe at suspect places to examine the pipe directly for corrosion. This has inherent limitations, as one portion of pipe does not always represent the entire pipeline.

“The Department of Transportation’s (DOT) Pipeline and Hazardous Material Safety Administration (PHMSA), acting through the Office of Pipeline Safety (OPS), administers the DOT’s national regulatory program to assure the safe transportation of natural gas, petroleum, and other hazardous materials by pipeline.” PHMSA, “About Us.” Pipeline safety is a broad yet crucial element in production of petroleum, which is often pushed aside in favor of economic concerns. For example, the OPS has jurisdiction over more than 2 million miles of pipelines but is one of the smallest units within the DOT. See PHMSA, Office of Pipeline Safety. As of 2007, the agency had only 90 pipeline inspectors and was budgeted for only 151 full-time employees. PHMSA, “PHMSA and Pipelines FAQs.” It commonly relies on state and local authorities to perform inspections. For decades, the agency has not known the exact whereabouts of thousands of miles of pipelines under its jurisdiction.
Two national tragedies sparked a renewed need for pipeline safety. In 1999, a pipeline in Bellingham, Washington released 250,000 gallons of gasoline, which exploded and sent a fireball more than a mile and a half long through the city, tragically killing three children. In 2000, twelve family members were camping in New Mexico when a gas pipeline ruptured 675 feet away, six were engulfed in flames immediately and it ultimately killed all of them. In response, to enhance the security and safety of pipelines, Congress enacted the Pipeline Safety Improvement Act of 2002. This Act brought about many reforms in the OPS. For example, for the first time, the OPS was given the power to order immediate corrective action for potential safety conditions so that ruptures can be prevented instead of only detected after they have occurred. In 2006, Congress again acted to provide for enhanced safety and environmental protection in pipeline transportation and enhanced reliability in the transportation of the Nation’s energy products by pipeline by enacting the Pipeline Inspection, Protection, Enforcement and Safety Act (PIPES Act). See 49 USC § 60101 et seq. After the PIPES Act expired in September of 2010, Congress introduced the Pipeline Safety, Regulatory Certainty, and Job Creation Act of 2011 again to provide for enhanced safety and environmental protection in pipeline transportation and enhanced reliability in the transportation of the Nation’s energy products by pipeline. The bill sought to strengthen pipeline safety programs, improve the nation’s pipeline network, and ensure the regulatory certainty in pipelines transportation necessary to create jobs. AG News, “House Transportation Committee Marks Up Pipeline Safety Reauthorization.” The President signed the bill into law on January 3, 2012. GovTrack, H.R. 2845.

Through these programs, federal records show that the pipeline industry reported 25% fewer significant incidents from 2001 through 2010 than the prior decade. However, the amount of hazardous liquids being spilled remains substantial as there were more than 100 significant spills every year. In addition, as recently as May 2014, the Office of Inspector General for the department of Transportation found that the PHMSA still “did not ensure that key state inspectors are properly trained, inspections are being conducted frequently enough and inspections target the most risky pipelines.” Thus, showing a still glaring need for education and training to keep pipeline transportation safe.