# Economic Impact

## *Permian Basin's Oil & Gas Industry*


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# The Economic Impact of the Permian Basin's Oil and Gas Industry

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**Executive Summary**

This study provides estimates of the 2013 economic impact of the Permian Basin's oil and gas industry. The study examines these impacts at the county level as well as in the context of the overall Permian region, the Texas portion of the region and the New Mexico portion of the region. In addition to traditional economic impacts, this report includes a petroleum engineering-based analysis that provides the backbone for economic activity generated by the oil and gas industry. The study also includes a county-level analysis of industry taxation. Overall, the focus of this study is on the value creation and economic sustainability that lies in upstream through midstream oil and gas industry activities. For purposes of this study, economic output refers to the value of all industrial production in a region (i.e., gross revenues), following the convention used by the U.S. Bureau of Labor Statistics (BLS) and Bureau of Economic Analysis (BEA), jobs are defined as the average annual number of jobs in a sector, industry, or region, while labor income consists of all forms of employment income, including employee compensation (wages and benefits) and proprietor income, and value added indicates the addition to Gross State Product.

The Permian Basin's oil and gas industry:[1]

- Sustains over 546,000 jobs
- Generates $137.8 billion in economic output
- Contributes more than $71.1 billion to the Gross State Products of Texas and New Mexico

The Texas Portion of the Permian Basin's oil and gas industry:

- Sustains over 444,000 jobs
- Generates $113.6 billion in economic output
- Contributes more than $60.2 billion to the Gross State Product of Texas

The New Mexico Portion of the Permian Basin's oil and gas industry:

- Sustains over 94,000 jobs
- Generates $22.7 billion in economic output
- Contributes more than $10.2 billion to the Gross State Product of New Mexico

The Permian Basin's Plays and Reservoirs help sustain economic activity:

- Several potential and confirmed Resource Plays have been identified and cover very large areas (multiple counties)

[1] The sum of the individual New Mexico and Texas portions of the Permian Basin is less than the overall estimates due to rounding and leakages (i.e., leakages occur in all economies in that not all monies spent are entirely contained within the study area). Generally speaking, the larger the study area, the more able the model is to capture the spending and consequently reduce leakages.

- Wells in a confirmed Resource Play exhibit a repeatable statistical distribution, thus offer a predictable performance in a given geological subset

Drilling Activity and Production is an important factor in providing current and future economic benefits:

- Permian Basin has the greatest rig count of any basin/region in the world (27% of the U.S. and 56% of Texas)
- A rapidly increasing amount of Permian Basin wells being drilled are horizontal (Since December 27, 2013, the number of horizontal, oil-directed rigs in the Permian Basin rose by 63, representing half of the total increase of those types of rigs in the United States)
- Permian Basin well productivity has improved dramatically since 2011 due to improved technology in horizontal drilling and multi-stage hydraulic fracturing
- Drilling efficiencies are being realized in all U.S. Resource Plays and the Permian Basin is the least mature, thus vast efficiency improvements are expected in the Permian Basin

Realization of changes in plays and technologies has far-reaching economic benefits to the Permian Basin region:

- Jobs, income, value added, and output are created and generated
- The region's economy is becoming more stable and growth more sustainable as a result of the way in which the oil and gas industry now functions

*Economic interpretation*

The Permian Basin's oil and gas industry is an important driver of economic activity in the region and beyond. The industry's activities generate and sustain jobs, income, output, and provide substantially to the gross state products of both Texas and New Mexico. In addition, through various measures of taxation, the industry provides many localized benefits to the citizens of both New Mexico and Texas. Recent innovations and discoveries in both plays and technologies have given rise to increased production of oil and gas and have led to additional economic benefits that will likely impact the region for years to come. As shown in this study, an analysis of oil production trends and cycles indicates these benefits include sustainable growth and a more stable economy than has been experienced in the past. Specifically, several potential and confirmed Resources Plays have been identified in the Permian Basin. Resource Plays (Shale Plays being a subset) are the most active drilling areas in the U.S. and have a number of characteristics that make the economics favorable. First, these Resource Plays cover very large areas (multiple counties). Second, they resemble more of a manufacturing type of process where thousands of wells are drilled and enable producers to take advantage of economies of scale. Moreover, wells exhibit a repeatable statistical distribution and offer a predictable performance in a given geological subset adding to favorable economics. On the technology side, the Permian Basin has the greatest rig count of any basin/region in the world (27% of the U.S. and 56% of Texas). A rapidly increasing amount of the U.S. and Permian Basin wells are being drilled horizontally. As such, Permian Basin well productivity has improved dramatically since 2011 due to improved technology in horizontal drilling and hydraulic fracturing. Drilling efficiencies are being realized in all U.S. Resource Plays and the

Permian Basin is the least mature, thus vast efficiency improvements are expected in the Permian Basin. Unquestionably, the Permian Basin's oil and gas industry is leading the way to new economic heights in Southeast New Mexico and West Texas.

**Introduction**

This report provides estimates of the economic impact of the Permian Basin's oil and gas industry. The study examines these impacts at the county level as well as in the context of the overall Permian region. The Permian Basin region covers parts of both New Mexico and Texas. The region is rich in oil and deposits and includes the legendary Delaware and Midland basins and a number of well-known plays such as Wolfberry/Spraberry, Bone Springs, San Andres, Clearfork, Cline Shale and Wolfcamp. The industry, as a whole, inherently provides economic benefits to the region and beyond. The oil and gas industry is characterized by a highly integrated supply chain that results in substantial employment, high paying jobs, investment, and economic growth. Moreover, the Permian's oil and gas industry contributes significantly to state and local governments through taxation.

The focus of this study is on the value creation and economic sustainability that lies in upstream through midstream oil and gas industry activities. Ultimately, economic impacts derive from the exploration, drilling and production of oil and gas which require a multitude of support activities for oil and gas operations. These core activities, in turn, lead to a number of non-core but very critical midstream supply chain activities such as pipeline, transportation, refining, and equipment manufacturing. The secondary effects of the oil and gas industry include the numerous expansions and continuing operations of suppliers to the industry as well as wholesale, retail, real estate and housing, and financial services, etc. that benefit from the increased dollars generated.

This report provides a brief overview of the history and importance of the oil and gas industry in the development and growth of the Permian Basin region. This report also includes a review of the economic landscape and current conditions that define the state of the economy. Additionally, a unique feature of this study is the inclusion and analysis of the petroleum engineering and geophysical factors that characterize this region. Permian Basin well productivity has improved dramatically since 2011 due to improved technology in horizontal drilling and multi-stage hydraulic fracturing. Drilling efficiencies are being realized in all U.S. Resource Plays and the Permian Basin is the least mature, thus vast efficiency improvements are not only being realized but expected in the Permian Basin. It is these factors that have led to the present state of production, that make possible the economic benefits of the industry, and that will play a vital role in the future development of the Permian Basin's economy. The economic benefits arising from the existence and continuing operations of the oil and gas industry are quantified in terms of employment, labor income (including proprietor's income), value added, and output. Additionally, this study provides a comprehensive analysis of taxation associated with the industry. A specific list of the counties comprising the Permian Basin and which are examined in this study is contained in the appendix.

## Objectives and Methodological Approach

The major objective of this study is to quantify the economic impacts of the Permian Basin's oil and gas industry. Specifically, these impacts are in the form of jobs created and sustained, economic output as measured by the value of all industrial production in an area or region, value added to state gross domestic product, and various forms of tax related revenues generated from the production and sale of oil and gas. The methodological approach of this research combines elements from the fields of both energy economics and petroleum engineering.

The research utilizes the IMPLAN economic impact modeling software. To fully capture the underlying factors of economic activity in the Permian Basin, historical economic and petroleum engineering data are collected and analyzed. The study includes analyses of oil and gas production, assessment of wells, drilling activity, drilling/completion technology and production trends, combined with economic analyses of oil and gas, to estimate the economic impacts of the industry. Results are presented for the Permian Basin as a whole, as well as for the New Mexico and Texas portions of the Permian Basin, and the counties comprising the Permian Basin.

The study is unique in that it blends expertise in energy economics and petroleum engineering to provide an engineering-based economic impact model that takes into account the geological, engineering, and economic nature of the industry.

## A Brief History of the Oil and Gas Industry in the Permian Basin

The Permian Basin is located in West Texas and southeastern New Mexico and is one of the world's leading oil and gas producing areas. However, defining the exact boundaries of the Permian Basin is a difficult task. Due to a better understanding of geological formations and new engineering technologies, what we know of as the Permain Basin has actually expanded over the years and today covers an area nearly 250 miles wide and 300 miles long. The region includes thousands of fields over several producing formations (e.g., Yates, Spraberry, Wolfcamp, Yeso, Bone Spring, to name a few) and spans nearly 50 counties, most which are in Texas. The total cumulative production for just the Texas portion of the Permian Basin exceeds 29 billion barrels of oil and approximately 75 trillion cubic feet of natural gas (Source: Railroad Commission of Texas, December 17, 2013). It's been said that, "as the Permian Basin's oil and gas industry goes, so goes the region's economy." That statement is not far off from reality, either. The historical production growth has led to the development of important centers of population and commerce, particularly the Texas cities of Midland and Odessa, but also Eddy and Lea counties in New Mexico. For example, Midland was the fastest growing metro area from July 2011 to July 1012, while Odessa was the fifth fastest growing metro area in the U.S. during the same time period. Likewise, Lea County experienced a population growth of 16.6 percent from 2000 to 2010.

The first major well in the Permian Basin (located in Mitchell county) was completed in the early 1920s, the Santa Rita No. 1, at a total depth of 2,498 feet. This well produced for several decades before being capped in 1990, giving an indication of the type of production that would come from the Permian Basin.

This discovery led to additional drilling fields including World field in Crockett County, McCamey field, and the Yates field in Pecos County. The Yates field is still producing today and is one of the top 50 fields for proved oil reserves in the U.S. These discoveries were made as a result of random drilling or surface/subsurface mapping. In 1928, the Hobbs field discovery came from magnetometer and torsion balance survey. The seismograph was being used around this same time as an exploratory tool and maps were providing outlines of the various basins.

Prior to 1928, most oilfields were at depths less than 4,500 feet due to deep tests not being economically feasible. However, large flows of oil and gas were discovered in the Big Lake Oilfield in Reagan County at a depth of 8,525 feet in 1928. While this discovery increased the prospects of the Permian Basin, it was the need for oil during World War II that provided the incentive to drill more and at greater depths. As such, several major fields were discovered during this time including Wasson, Slaughter, and Seminole, which are all still producing today. In fact, these fields are still ranked by the Energy Information Administration among the top 20 in the U.S. for remaining proved reserves.

In the 1940s with the help of more advanced scientific techniques, several additional structures were uncovered. One such example was the Horseshoe Atoll, which yielded several significant fields. However, the Spraberry has been the major play and continues to be a profitable play with its predictable reserves. The Spraberry lies above the Wolfcamp in the Midland Basin and today is about 150 miles long and up to 35 miles wide.

The Permian Basin and the various operators have experienced production swings over the past several decades from fluctuations in oil prices to the development of new technologies. For example, in the 1970s, total production from the Permian Basin was around two million barrels a day. In the past, oilfield operators would only drill and complete the Spraberry/Dean. Recently, operators started deepening these wells into the Wolfcamp and comingle to gain extra production. In the early 2000s, multi-stage hydraulic fracturing techniques were refined which led producers to go deeper and to commingle even more productive zones with the Spraberry. The combination play of the Spraberry, Wolfcamp, and other formations has been nicknamed the "Wolfberry." On the Delaware Basin side of the Permian, another combination play of the Bone Spring sands with the Wolfcamp led to the nickname "Wolfbone." These are some of the examples illustrating the potential of multi-stage hydraulic fracturing and horizontal drilling that has led to the increase in recent activity in the Permian.

Today, total crude oil production in the Permian Basin is around 1,400,000 barrels a day (Energy Information Agency, Drilling Productivity Report). Over the past couple of years, there has been a resurgence in drilling activity in the Permian Basin. For example, the number of drilling permits issued has more than doubled since 2005, while the rig count has more than tripled since 2005 from 129 rigs to 415 as of 2012 and to over 500 at the time this report was written. A large portion of the aforementioned rigs in the Permian Basin are now drilling horizontally. 12% of the drilling permits issued in 2005 were for horizontal wells compared to 41% in 2013. The total crude oil production has gone from 253 million barrels in 2005 to 312 million barrels for the calendar year 2012 and will be even greater at year end 2013.

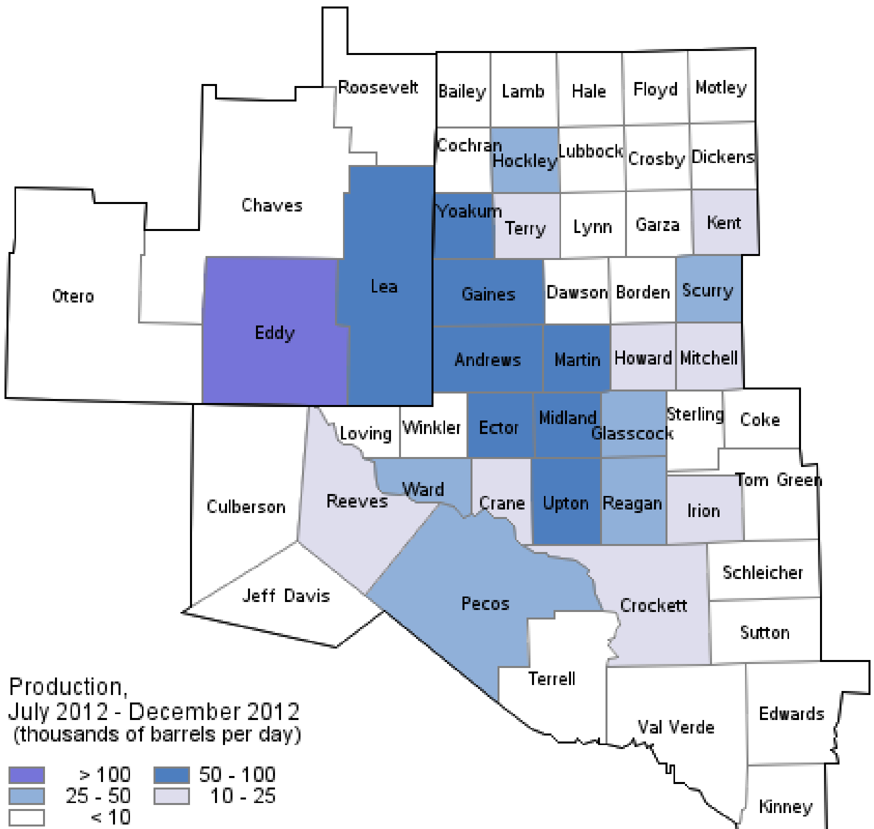
Growth in drilling and production has spearheaded the economic growth of the Permian Basin for decades. The Texas Permian Basin's crude oil production is 57 percent of Texas' annual crude oil production and about 14 percent of the total annual U.S. crude oil production. Historically, the Texas portion of the Permian Basin represents about 90 percent of the oil production and about 80 percent of the gas production. However, over the past decade, the New Mexico portion has increased as the Texas share of oil production now compromises only about 70 percent of the total Permian Basin and the gas production compromises about 65 percent. Most recently, the Cline Shale has gained attention by extending farther north and east across the Eastern Shelf totaling 70 miles wide and 140 miles long. While the recoverable reserves are uncertain, producers are still drilling many Cline horizontal producers to assess the commerciality of the Cline Shale.

**The Economic Landscape of the Permian Basin: Current Conditions**

The region known as the Permian Basin has experienced phenomenal economic changes in recent years. The area was not entirely immune from the worst national recession in decades (2008-2010), a national housing crisis, and a financial crisis. However, the region has retained its reputation for withstanding adverse economic conditions and as the national recovery is well underway, the energy sector leads the way towards a bright future. In fact, output in oil and gas is approaching the record levels of several decades ago. Improvements in technology—hydraulic fracturing, horizontal drilling – coupled with geological discoveries, make the economy of 2013 one of the best years ever for the Permian Basin.

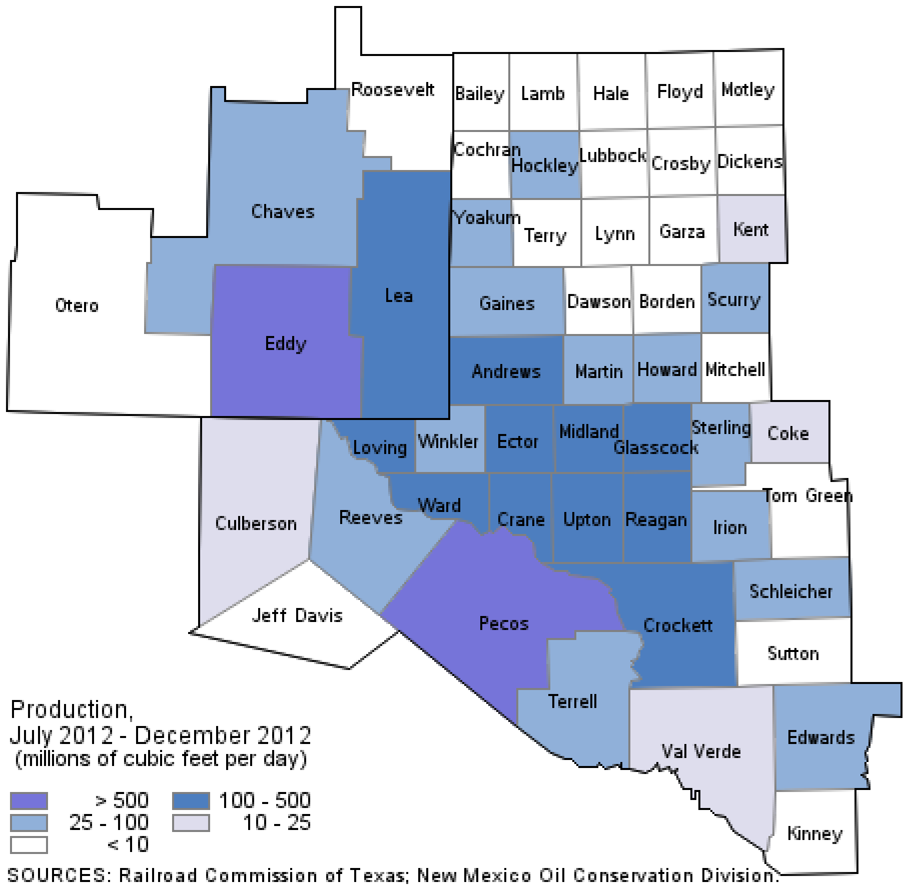
The following two figures show oil and natural gas production by county in 2012 and highlight the extent of activity going on in this region.

Oil Production Zones in Permian Basin



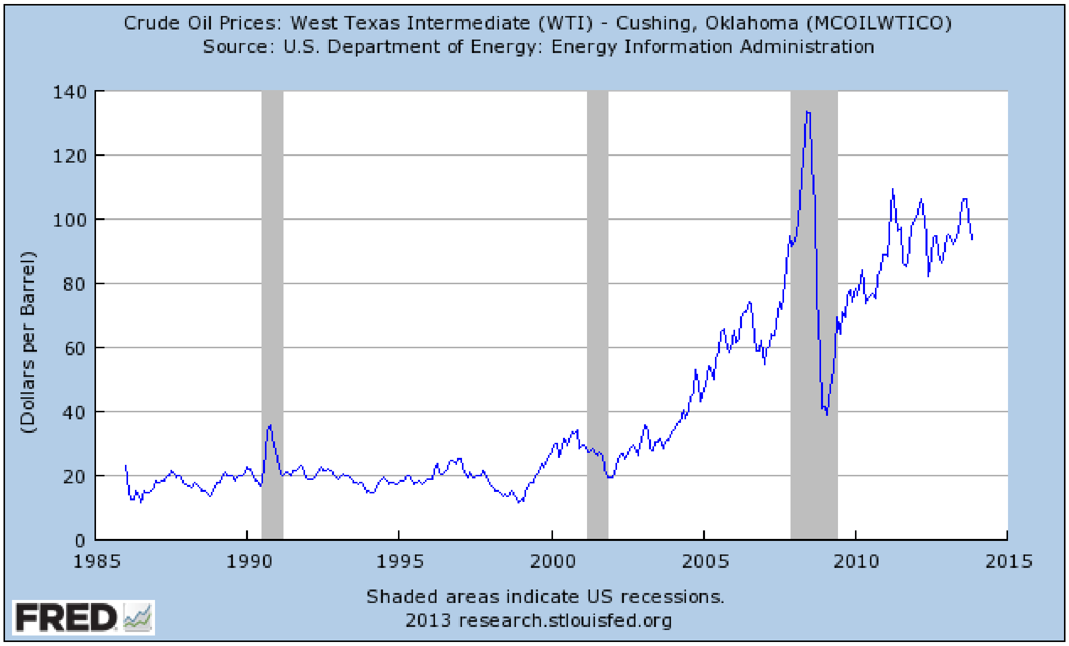
SOURCES: Railroad Commission of Texas; New Mexico Oil Conservation Division.

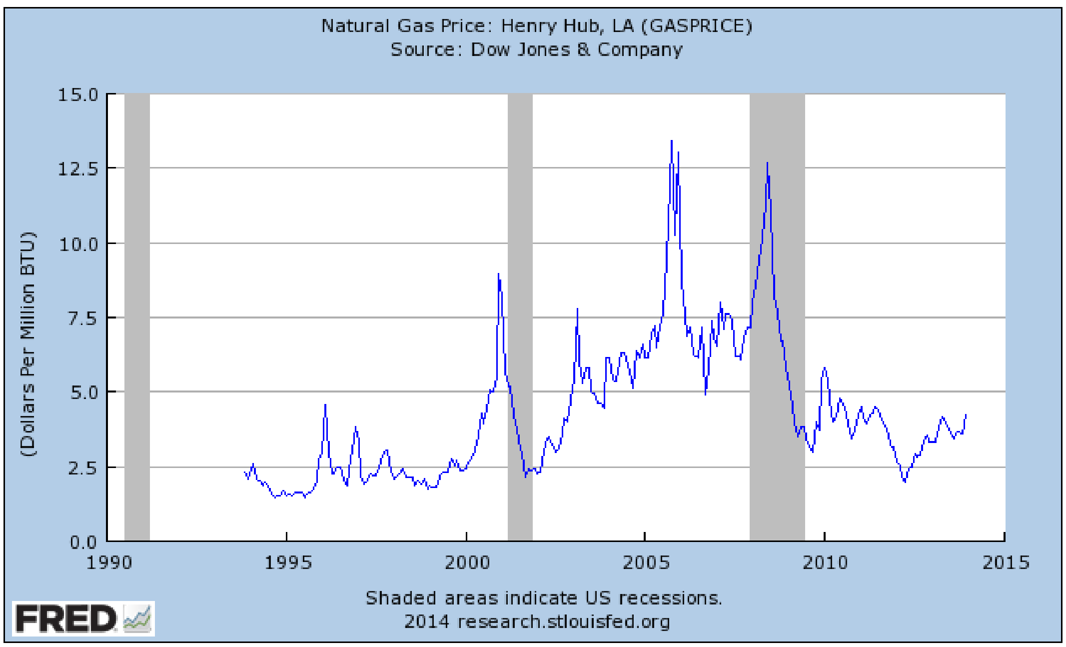
**Gas Production Zones in Permian Basin**




It is the combination of the application of technology with economic factors (e.g., operations, energy prices, material and input costs, supply chain linkages, to name a few) that forms the basis for the economic impacts of the oil and gas industry. The larger metropolitan statistical areas in the region have lower unemployment rates than state and national averages. The preliminary end-of-year 2013 unemployment rate for New Mexico is 6.3% and for Texas is 6.0%. Unemployment rates for the Midland MSA and Odessa MSA are 3.1% and 3.6%, respectively, while the Lubbock MSA is 4.7%. At the county level, the U.S. Bureau of Labor Statistics reports the unemployment rate (August 2013) for Eddy county (NM) is 3.9% and for Lea county (NM) is 3.8%. The employment picture is similar in many of the Permian Basin's lesser populated counties, also, with Andrews county at 3.6% and Sterling county at 2.7%, to name a few.

The following two graphs from Federal Reserve Economic Data (FRED) show the time series plots of crude oil and natural gas prices. It is clear that the landscape has changed a bit since the last recession. First, both crude oil and natural gas prices are generally volatile, but each also reached a peak shortly after the start of the recession prior to dramatic drops in price. However, while natural gas prices have remained relatively low, crude oil prices have continued on an upward trend.  This change in pricing patterns has led the oil and gas industry to substitute drilling and production activities from gas to oil.



**Plays and Reservoir Description within the Permian Basin**

A map showing all the current plays in the Permian Basin is shown in Figure 1.1. To effectively assess the plays/reservoirs in this study, the counties in the Permian Basin [Appendix A] are divided into three regions: the Midland Basin, the Delaware Basin portion of Texas and the Delaware Basin portion of South East New Mexico. Oil and gas productions in these three regions are shown in Figures 1.2 through 1.6. Also, detailed assessment the most active plays/reservoirs in each Texas Railroad commission districts and South East New Mexico are shown in Appendix C. Based on these surveys, the Bone Spring and Yeso Plays, located in the Delaware basin are the most active plays. The most active wells targeting these plays are predominantly located in south east New Mexico. In addition, the Spraberry/Wolfberry Trend is the next largest play.

All of these plays are either considered or may be potentially a Resource Play as defined by the Society of Petroleum Evaluation Engineers (SPEE). The SPEE parameters stated in its book, "Monograph 3; Guidelines for Practical Evaluation of Underdeveloped Reserves in Resource Plays," are given in Appendix B.

Resource Plays have also been called "Unconventional Plays" or "Unconventional Reservoirs". These Resource Plays are important to this study as they result in long term sustained activity. However, they are very price sensitive, as will be addressed later in this report. The Spraberry activity, located in the Midland Basin is attributed to downhole reservoir commingling and hydraulic fracturing techniques recently being employed by operators in the Permian Basin. The Spraberry wells are predominantly vertical. Activities of the Bone Spring (Delaware Basin) and Wolfcamp play (Midland Basin) can be attributed to horizontal drilling and hydraulic fracturing technology. Detailed completion activity by county and play in these Texas Railroad commission districts and south east New Mexico are shown in Appendix C. Within these districts, the Spraberry Play is the predominant play, followed by the WolfBone/Wolfcamp.

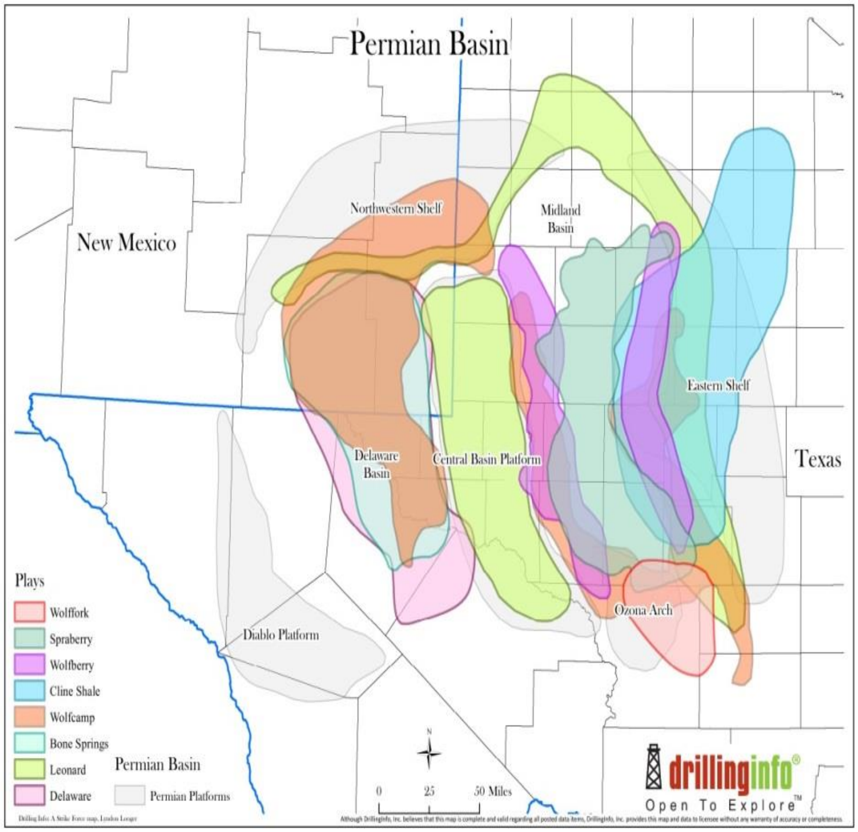



Figure 1.1: Map of Plays/Reservoir Distribution in the Permian Basin (Source: DrillingInfo)

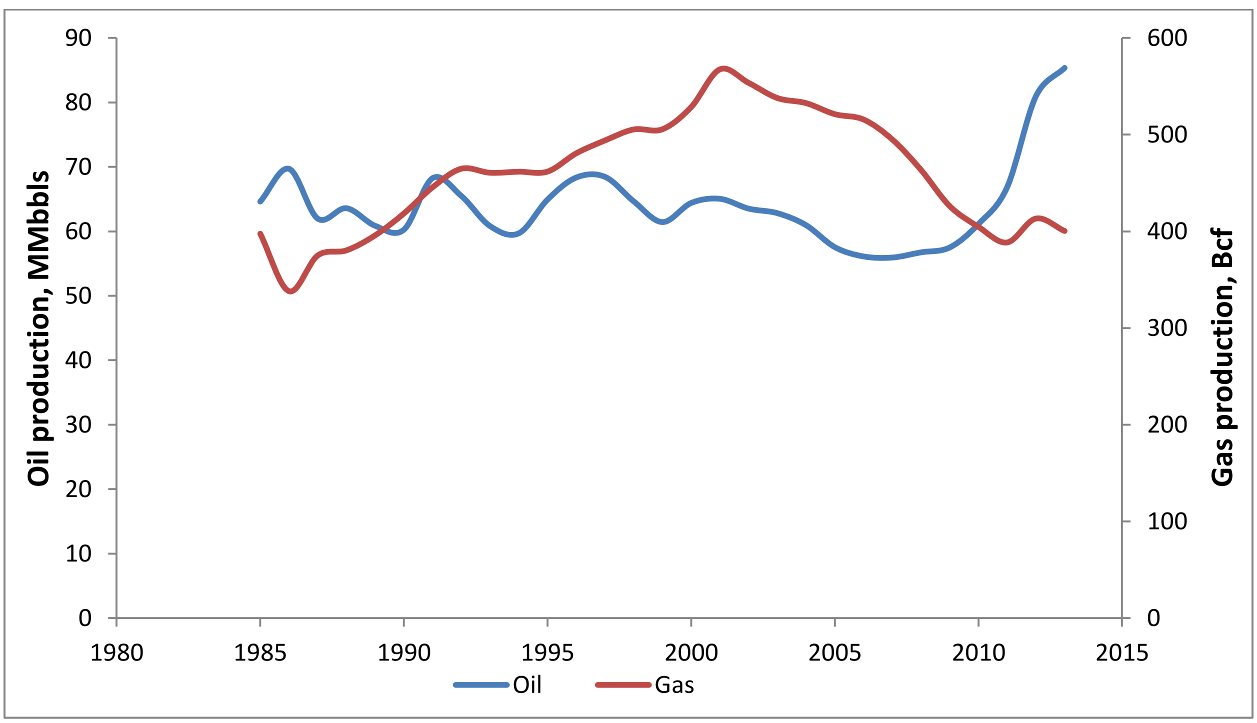



Figure 1.2: Delaware Basin South East New Mexico Historical Production

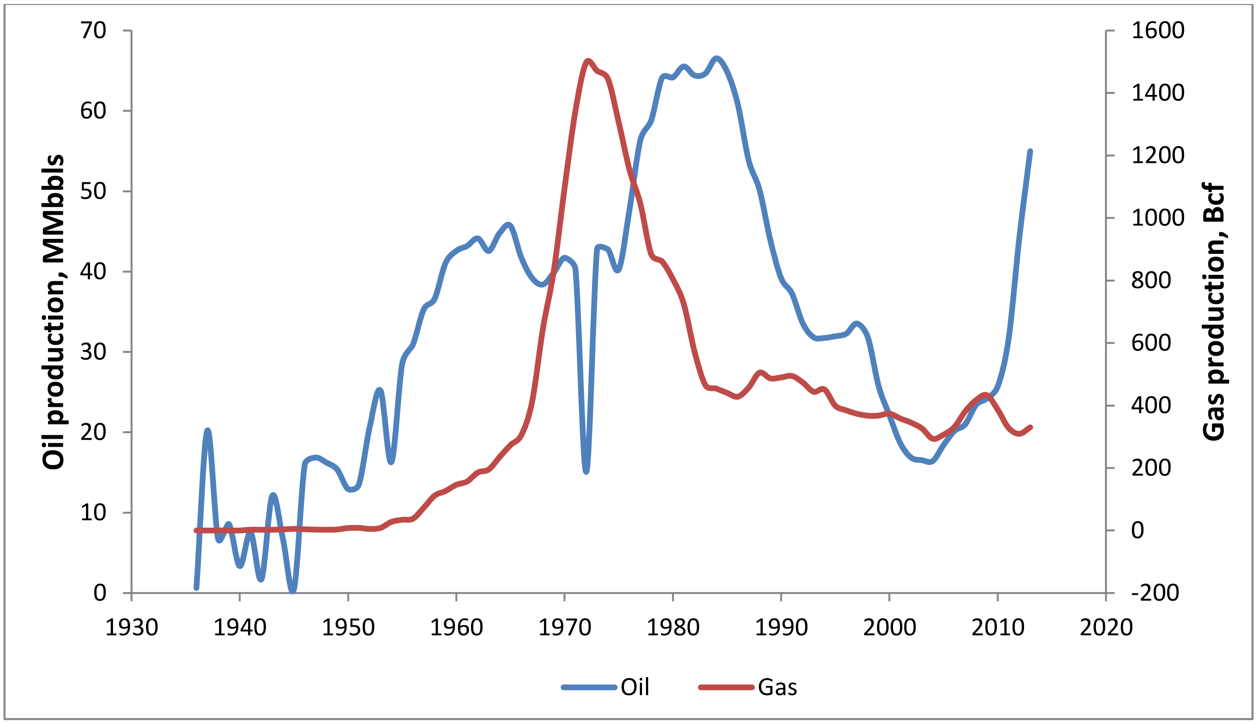



Figure 1.3: Delaware Basin Texas Historical Production

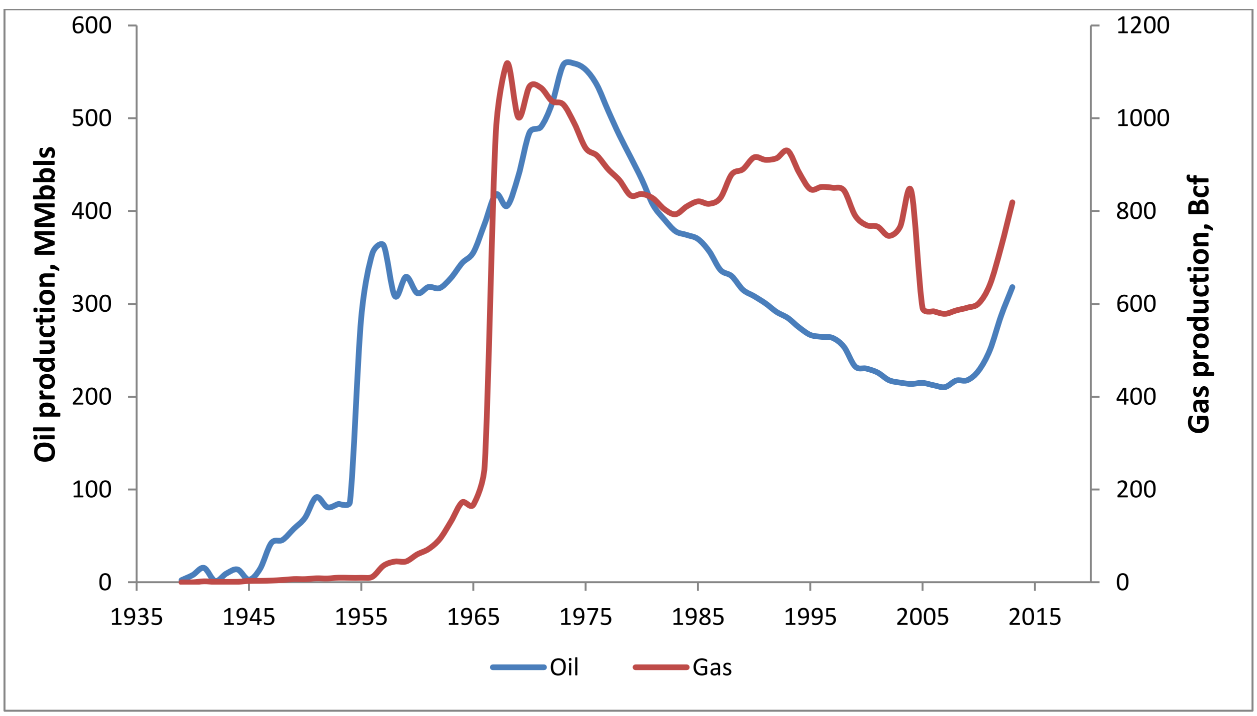



Figure 1.4: Midland Basin Historical Production

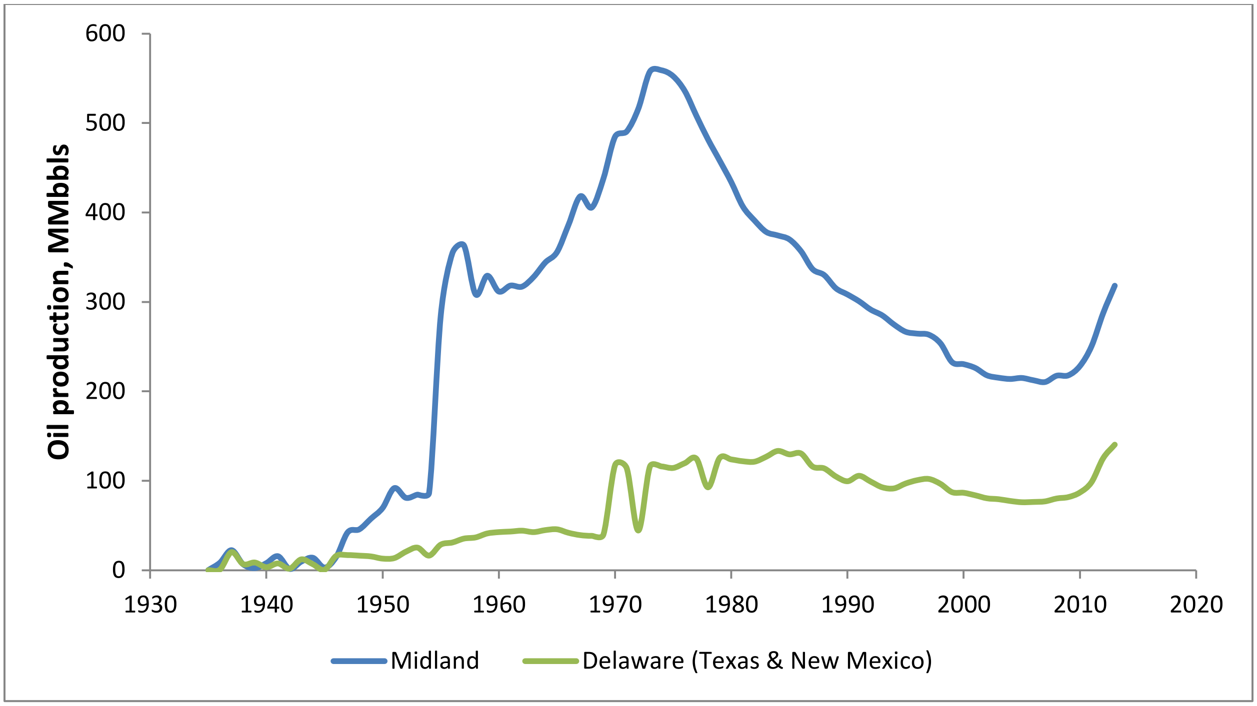



Figure 1.5: Entire Permian Basin Historical Annual Oil Productions

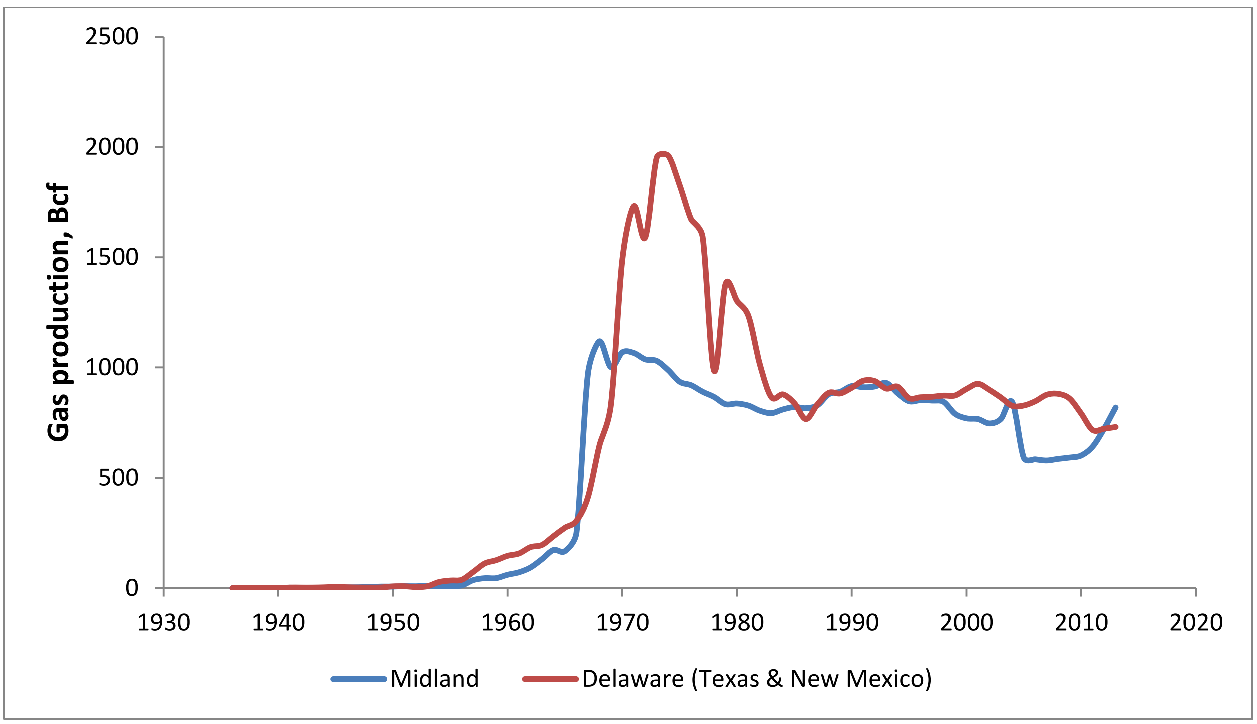



Figure 1.6: Entire Permian Basin Historical Annual Gas Productions

**Assessment of Wells Drilled to Date and Production by Basin**

The Permian Basin is spread across the states of Texas and New Mexico and a comparison is made herein between this basin and other basins located within the two aforementioned states in Figures 2.1 through 2.4. The Permian Basin has the highest number of wells drilled, with over 392,000 wells (37%), followed by Texas Coast Basin, which contains the Eagle Ford Play, with 257,938 wells (24%) as shown in Figure 2.1. The Texas Gulf Coast and Ft. Worth Basins, the latter of which contains the Barnett Shale Play, have the highest daily average gas production of 8.5 Bcf and 6.3 Bcf respectively, followed by the Permian with over 5.1 Bcf/d (17.3%) as seen in Figure 2.2. However, as shown in Figure 2.3, the Permian Basin has the highest liquid daily average production with over 1.49 MMbbl (44.6%), followed by Texas Gulf Coast Basin with 1.46 MMbpd. Note that the Eagle Ford Shale Play is located in the Texas Gulf Coast Basin and the Barnett Shale Play is located in the Ft. Worth Basin.

Since early 2012, as shown in Figure 2.4, average breakeven cost has declined due to improved drilling/completions efficiency and liquid production in the Permian, Bakken and northwest portion of the Eagle Ford. Gas prone plays, like the Barnett Shale Play will probably experience no growth in drilling activity and may even decline in the near term due to the drop in gas prices relative to sustained high oil prices. The northwest portion of the Eagle Ford is liquid prone, as is the Bakken and Permian Basin, thus will continue to see an expanding drilling program. As seen in Figure 2.4, the Eagle Ford, Bakken, and Permian Basin Plays are economic in the sub-$50/bbl oil price environment. As seen in Figure 2.5, the Permian Basin Plays located in the Midland and Delaware Basins are larger than the Bakken and Eagle Ford Plays. In addition, the Permian Basin has more multilayer targets in a given area than either of the two other plays.

Over 182,000 wells are currently reported active in the Permian Basin, with approximately 130,000 (71%) oil wells and over 26,000 (15%) gas wells and the remaining 14% for injection purposes (Figures 2.6 and 2.7). Water and $CO_2$ injection, for the purpose of secondary and tertiary oil recovery, have substantially influenced oil production and operations since 1960. $CO_2$ flooding commenced in the late 1970's and has recently seen more activity as a result of increased oil prices. Almost 26,000 wells (14% of active wells) are being utilized for injection purposes. Of the 156,000 active producing oil and gas wells in the Permian Basin, over 34,000 (22%) are directional and horizontal wells and the remaining are vertical wells, as shown in Figure 2.8.

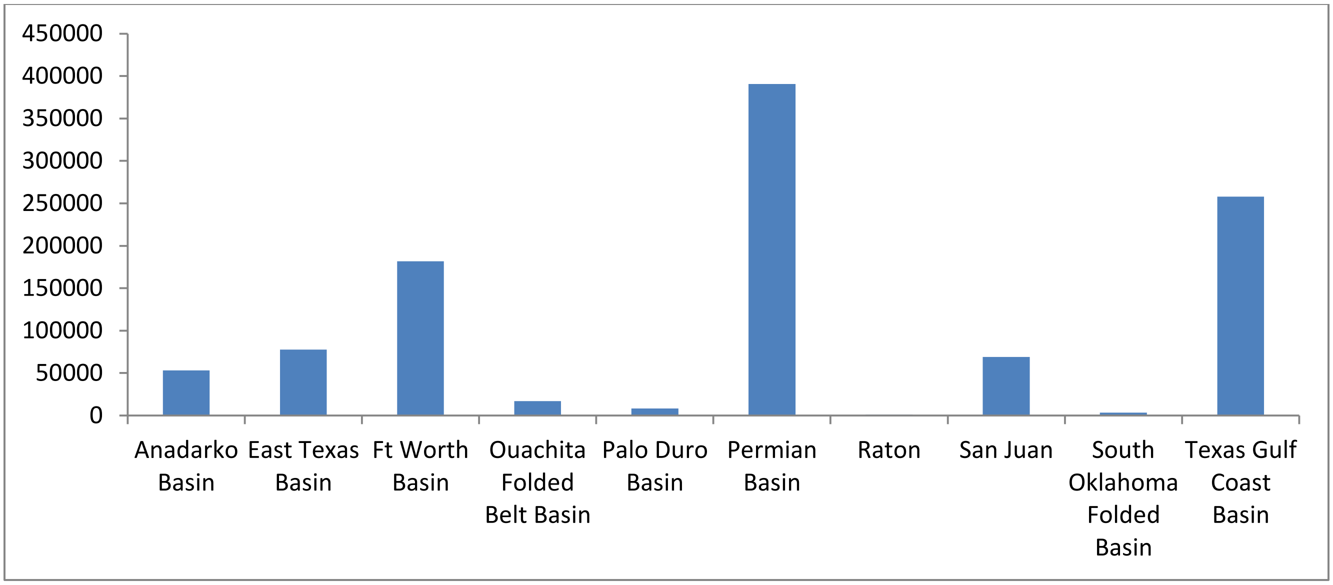



Figure 2.1: Number of Wells Drilled in the Permian Basin vs. Other Basins in Texas and New Mexico from Inception through December 2013 (Source: DrillingInfo)

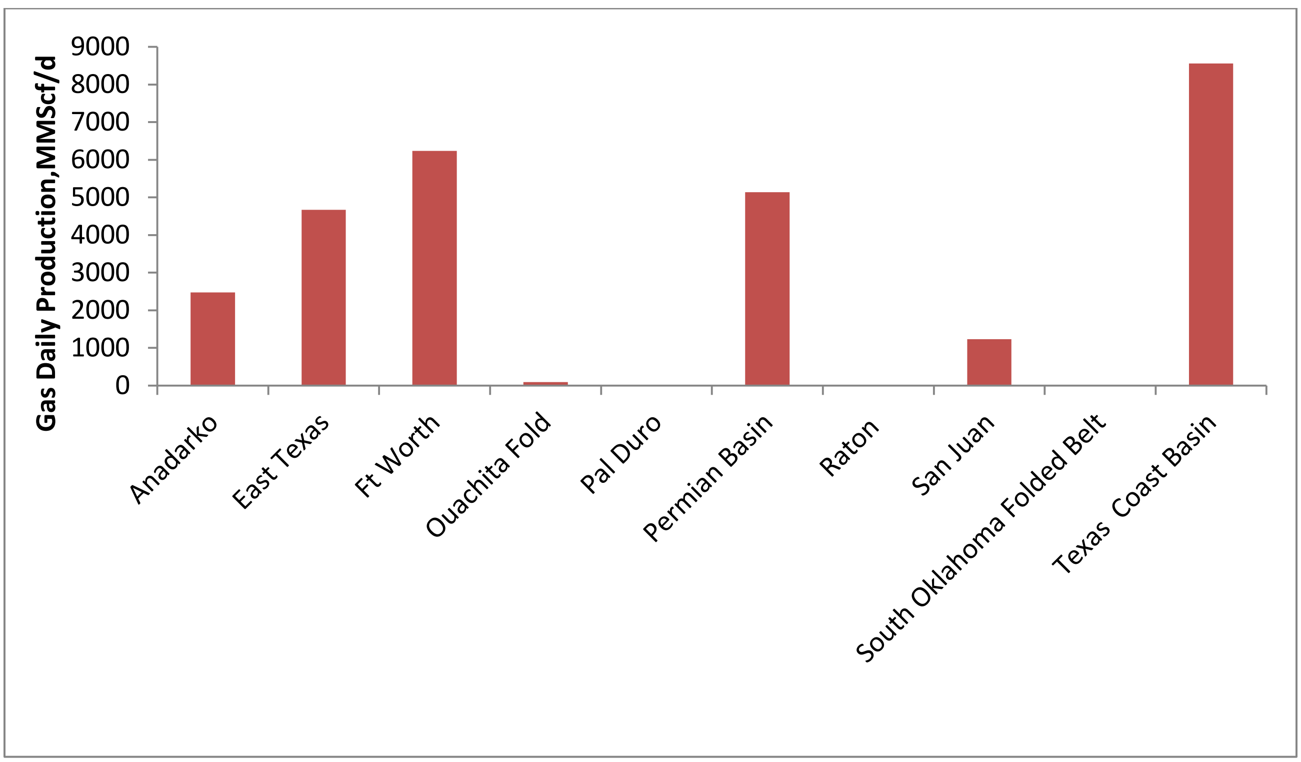



Figure 2.2: Daily Gas Production from all Basins in Texas and New Mexico (Source: DrillingInfo)

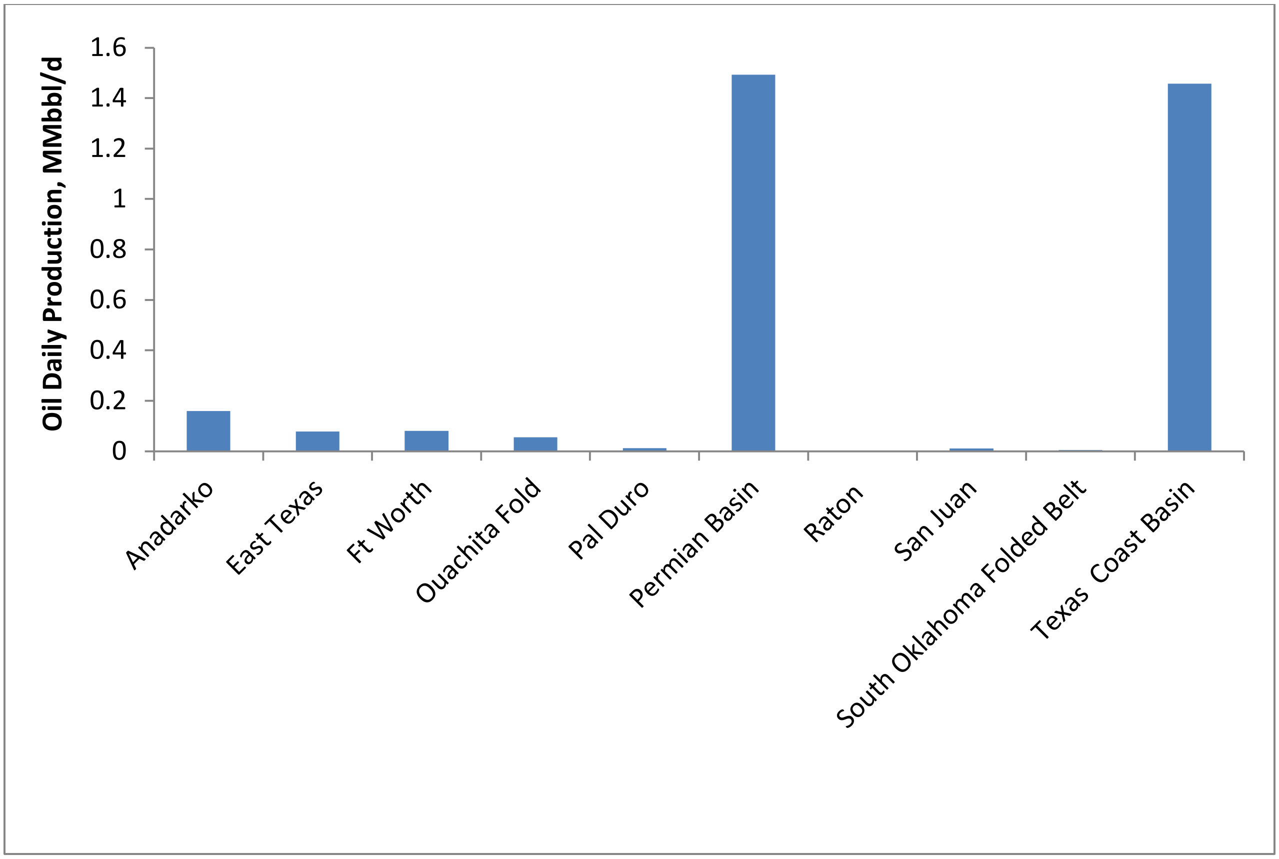



Figure 2.3: Daily Oil Production from all Basins in Texas and New Mexico (Source: DrillingInfo)

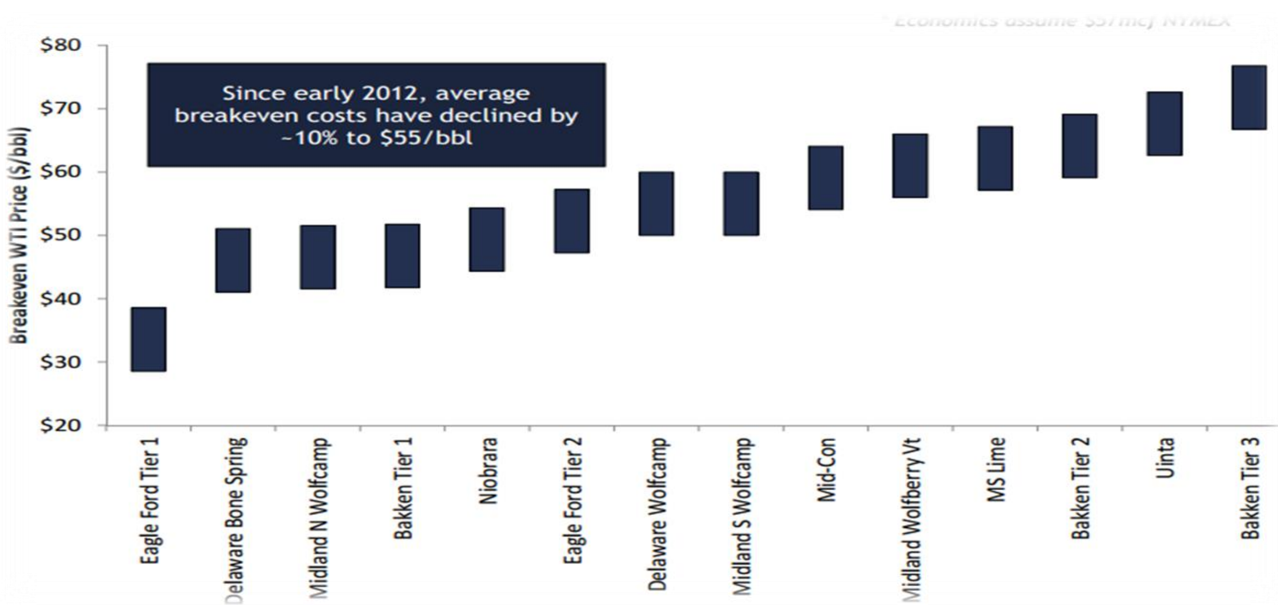



Figure 2.4: Breakeven WTI Price of the Permian Basin vs. Other Plays since Early 2012 (Source: Tudor, Pickering, Holt & Co Research)

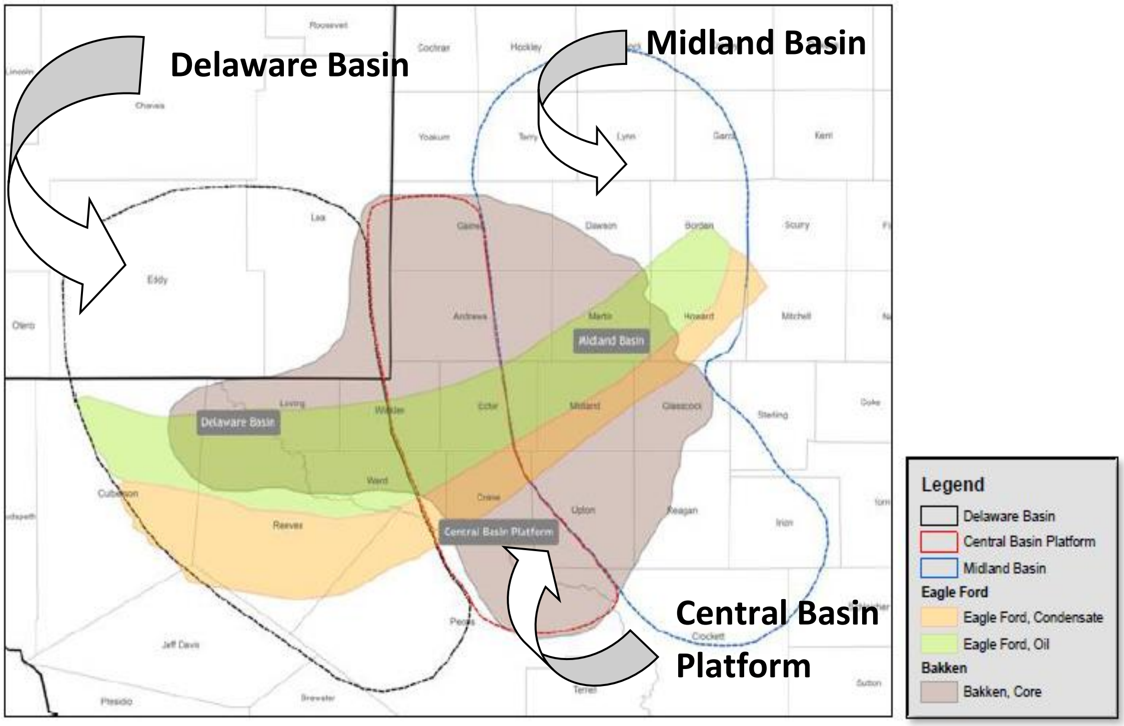



Figure 2.5: Size of the Permian Basin Compared to the Eagle Ford Oil and Bakken Plays (Source: Tudor, Pickering, Holt & Co Research)

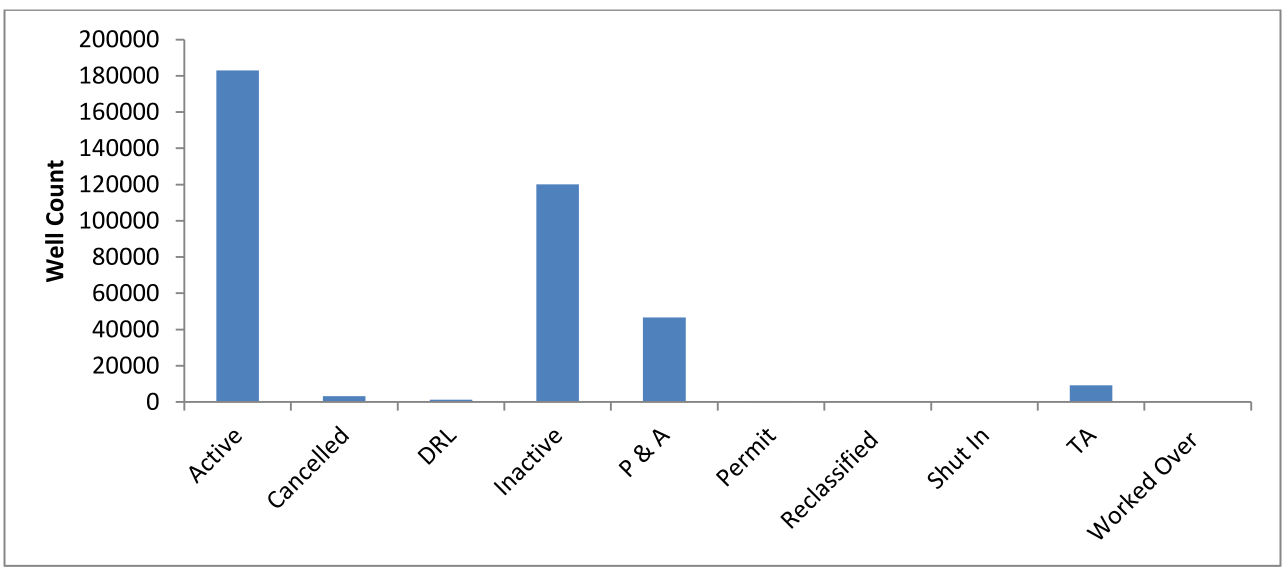



Figure 2.6: Well Status Distribution of the Permian Basin since Inception (Source: DrillingInfo)

DRL = Drilled P & A = Plugged and Abandoned TA = Temporarily Abandoned

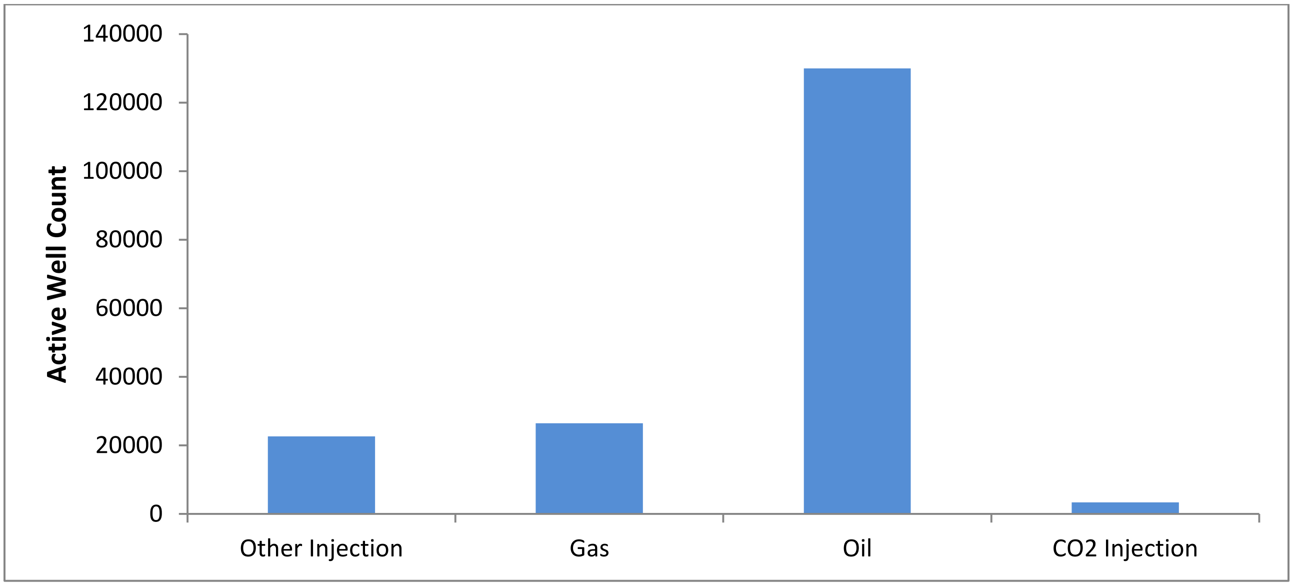



Figure 2.7: Active Well Type Distribution of the Permian Basin (Source: DrillingInfo)

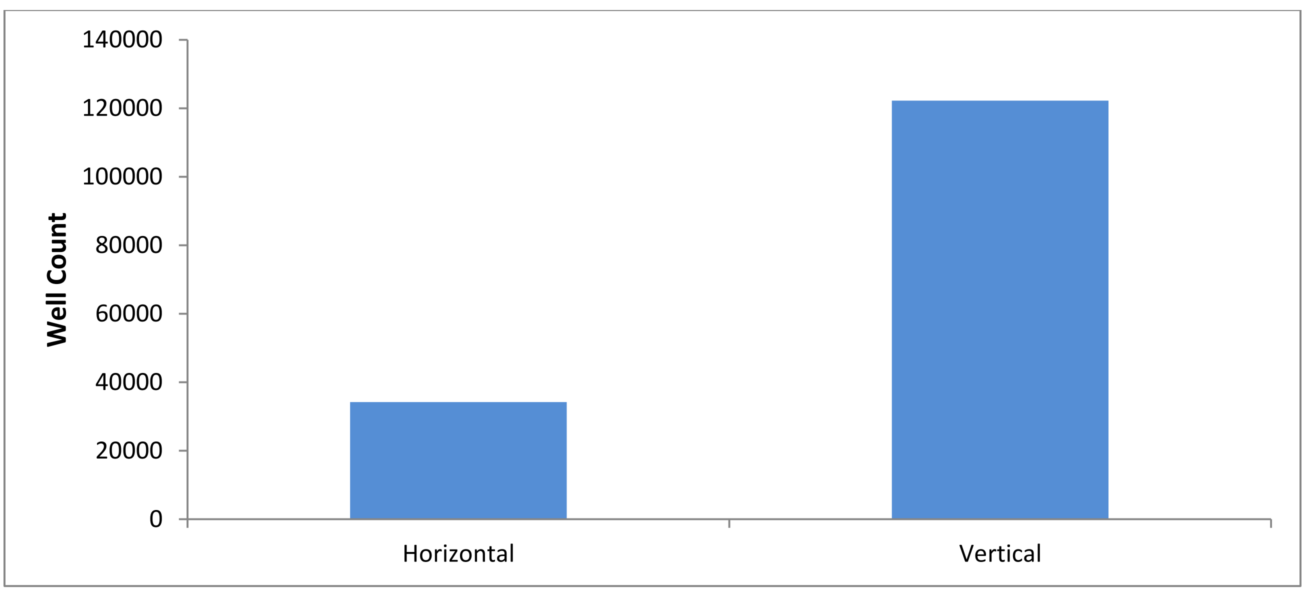



Figure 2.8: Active Drill Type Distribution of the Permian Basin since inception (Assumed that "Unknown" Wells are most likely Verticals) (Source: DrillingInfo)

**Drilling Activity**

The United States has the highest number of rotary rigs with 1757 or 53% of the World's total rigs in operation as at December 2013 (Figure 3.1). The Permian Basin has the highest number of rigs than any other basins/region of the World, with 469 as at December 27, 2013. This represents 56% of the active rigs currently running in Texas, 27% of total rigs running in the United States, and 14% of total World rig count.

An increasing percentage of the wells are being drilled horizontally as a result of the advancement of hydraulic fracturing and horizontal drilling technology. In fact, in the last two years, most of the rigs in the U.S. are drilling directional/horizontally versus vertically. Over the last year, the number of horizontal rotary rigs increased by 84 rigs and the number of rotary rigs drilling vertically decreased by 90 as shown in Figure 3.2.

As shown in Figure 3.3, there are 835 rigs (48% of the U.S.) in Texas and 81 rigs (5% of the U.S.) in New Mexico. As can be seen in Figure 3.4, the Permian Basin has the highest drilling activity as compared to other plays/Basins in the United States. In addition, the Permian Basin saw an increase of 6 rigs over the last year. The total number of rigs in Texas increased by 13 while New Mexico's decreased by 3 rigs from last year (2012). Figure 3.5 shows a consistent historical increase in the number of rotary drilling rigs in Texas and the Texas portion of the Permian Basin since 1987. Also, as seen in Figure 3.5, there was a dramatic drop in Rig count due to the 2008 recession, however, rig counts quickly recovered and were back to pre-2008 levels by 2012. The reason for this is after the 2008 recession, natural gas prices never recovered while oil prices quickly recovered back to pre-2008 prices, and then continued to increase. Since oil and gas companies have refocused capital budgets to oil (liquids) prone basins, thus areas that benefited the most were the Permian Basin, Bakken Play (Williston Basin), and the Eagle Ford (Texas Coast Basin). Thus while Texas shale gas plays, such as the Barnett and the Haynesville, saw a sustained drop in rig count, the Permian Basin and the Eagle Ford more than made up for that drop.

Figure 3.6 shows a decline in drilling rigs running in the Permian Basin since early 2012. Fig 3.6 is weekly data whereas Fig 3.5 shows annual averages of Rig counts. The reason for this decline is that operators are switching from vertical to horizontal drilling, which requires more personnel per well. In addition, horizontal wells are more efficient in draining reservoirs (less wells per unit area). As reported in the 2013 SPE Forum on Petroleum Engineering Education, it takes three times the personnel for unconventional reservoir/horizontal well development as opposed to that required for conventional/vertical wells.

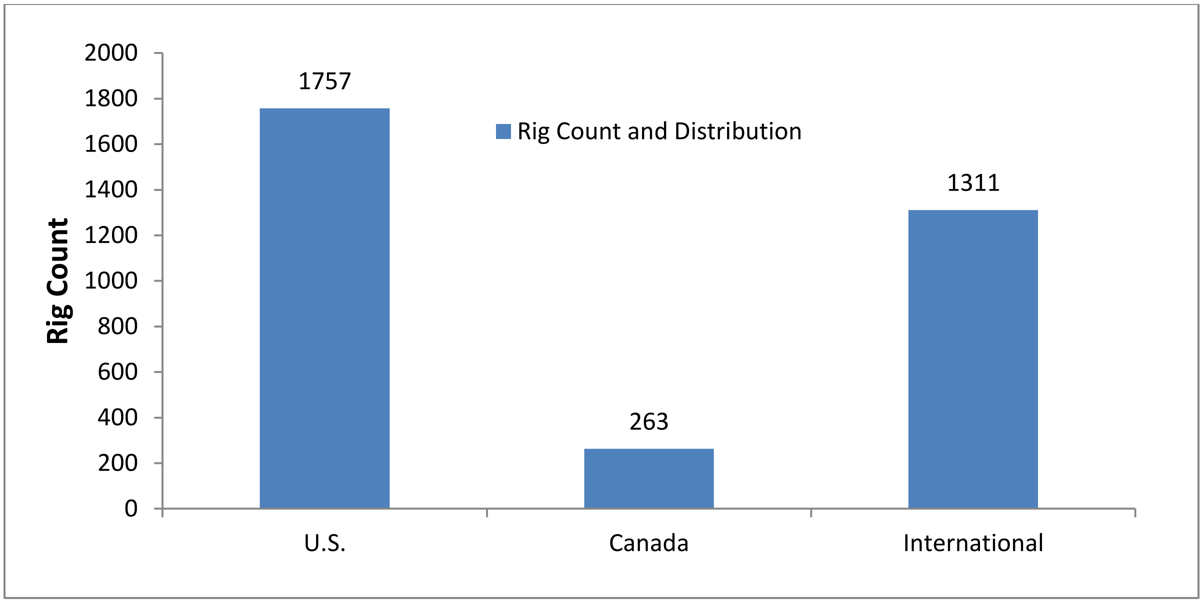



Figure 3.1: Global Land Rig Count, Week Ending December 2013 (Source: Baker Hughes)

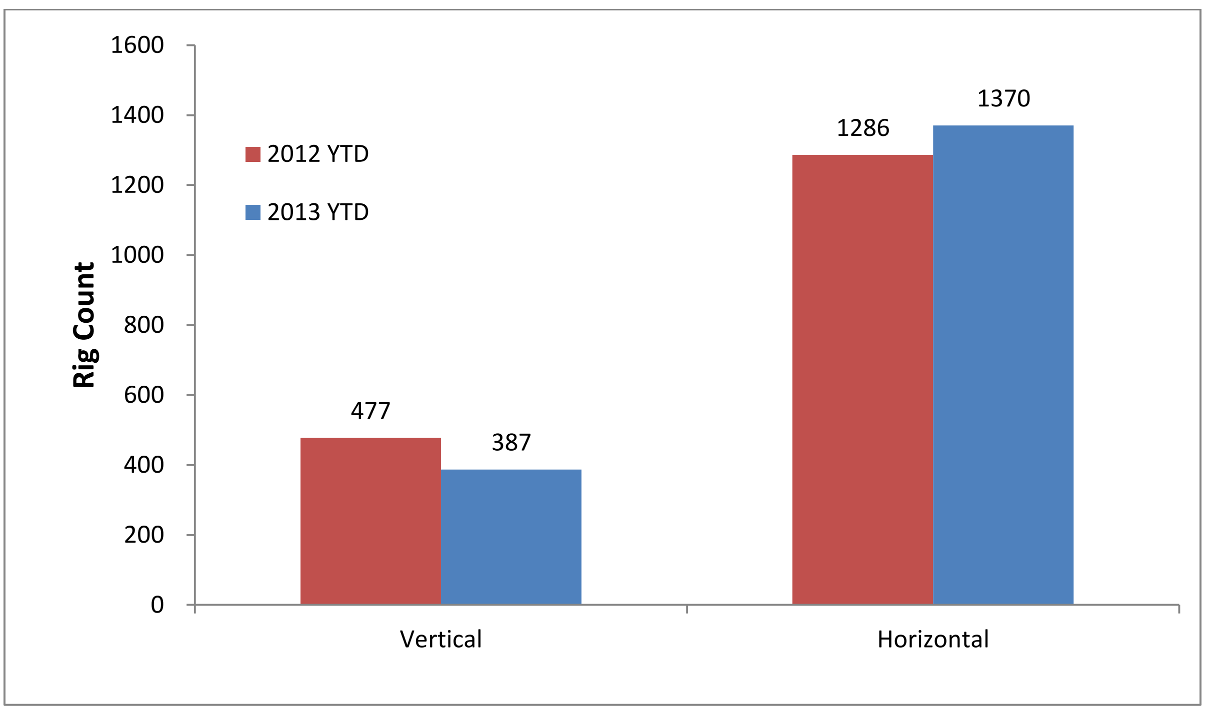



Figure 3.2: U.S. Rotary Rig by Drill Type and Change from Last Year (Source: Baker Hughes)

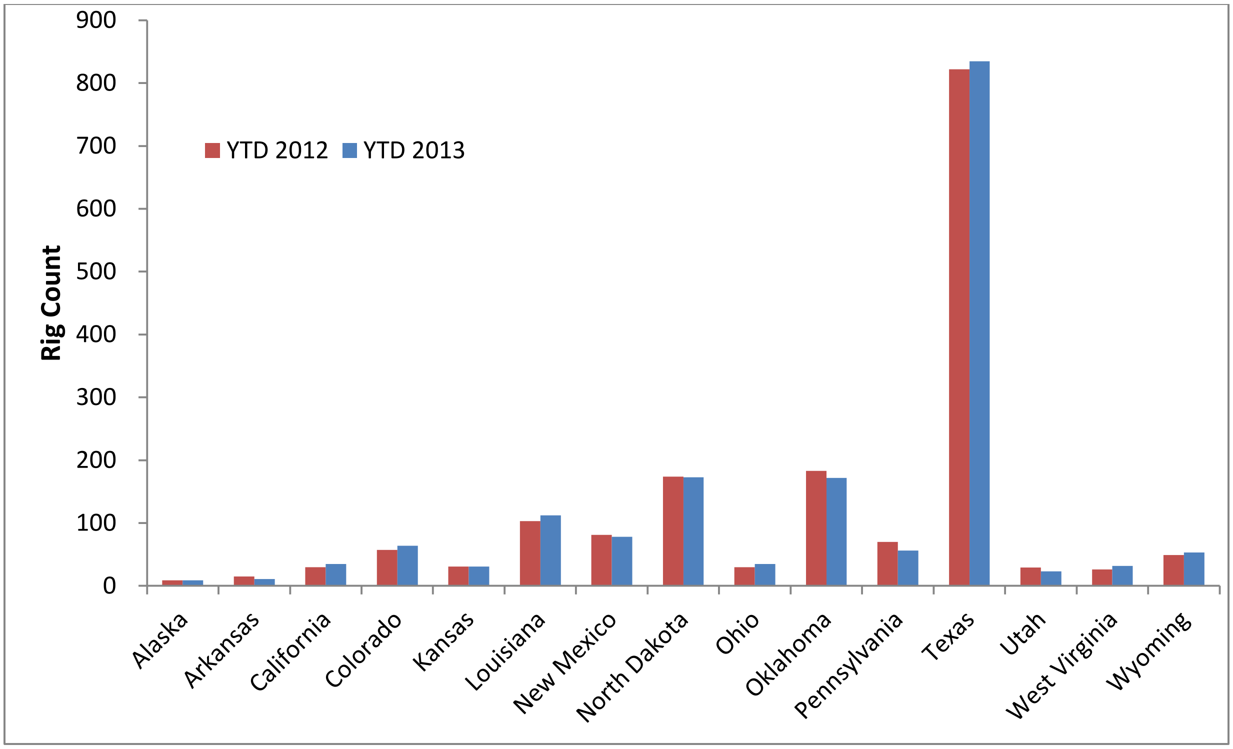



Figure 3.3: U.S. States Rig Count and change from Last Year (Source: Baker Hughes)

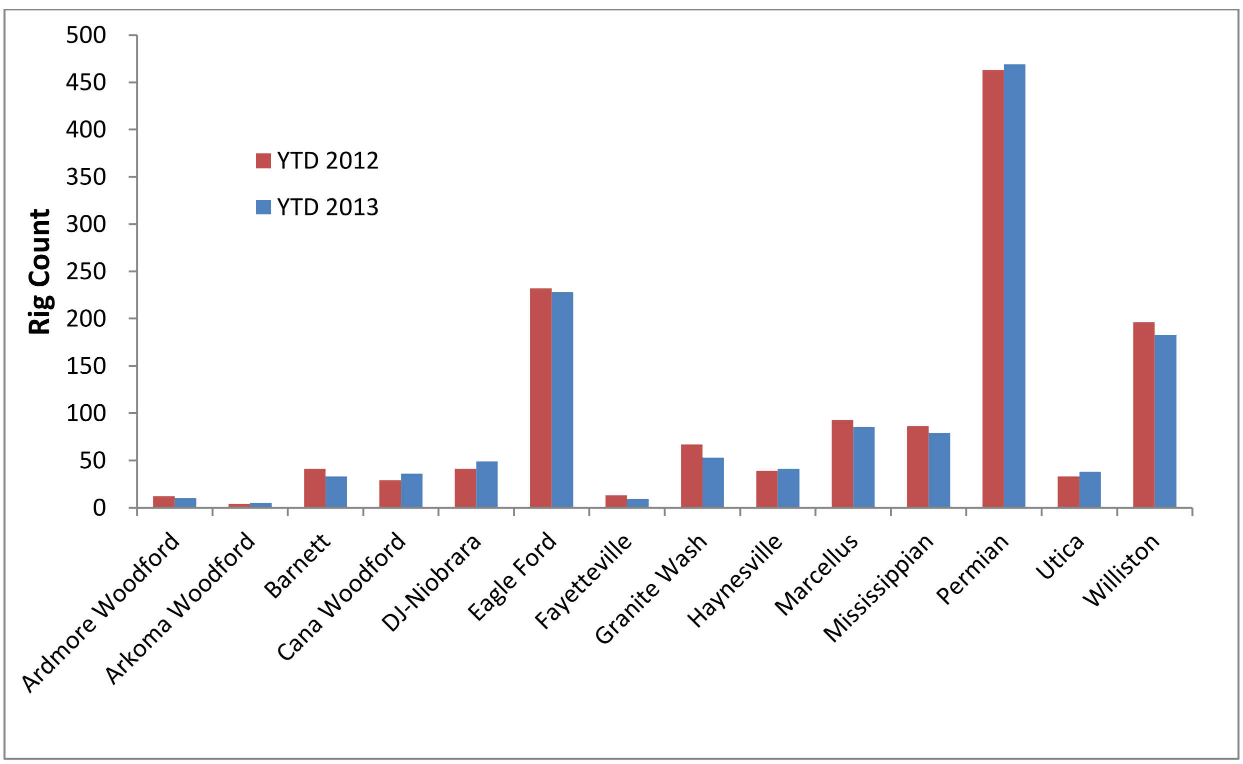



Figure 3.4: Basin/Plays Rig Count and Change from Last Year (Source: Baker Hughes)

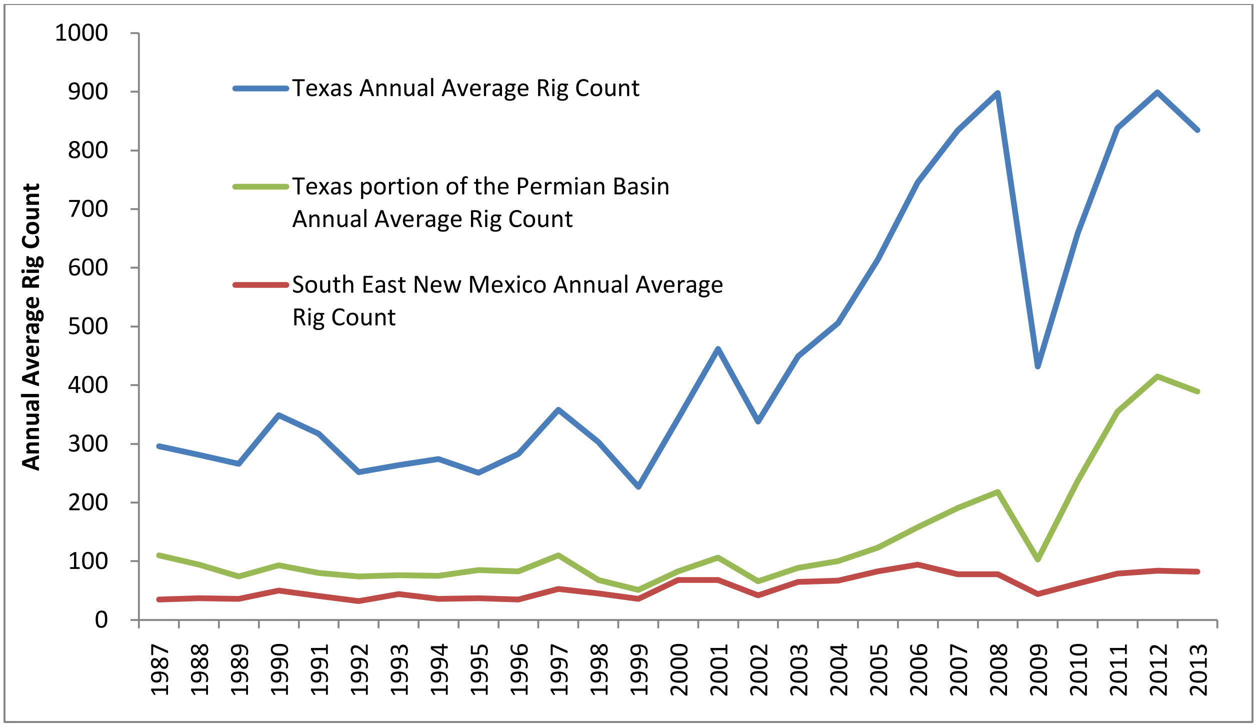



Figure 3.5: Historical Annual Average Rig Count of Texas and Texas Portion of the Permian Basin (Source: Baker Hughes)

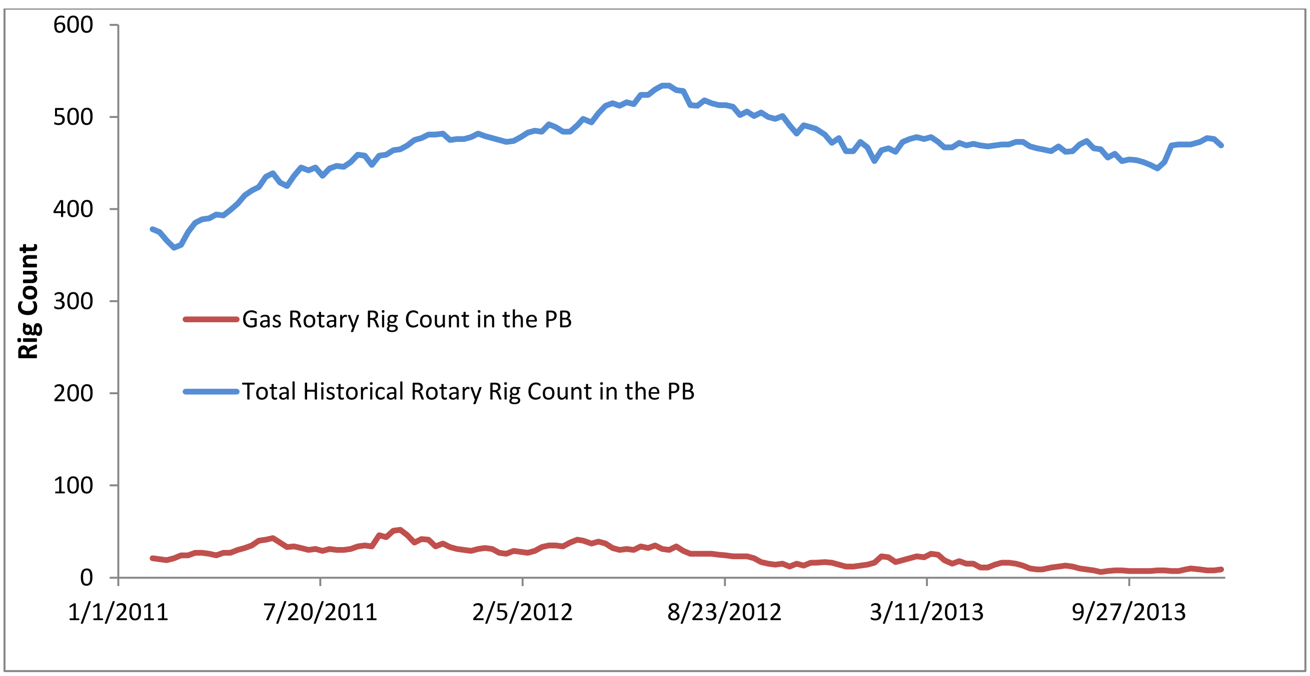



Figure 3.6: Detailed Annual Average Rig Count of the Permian Basin from 2011 (Source: Baker Hughes)

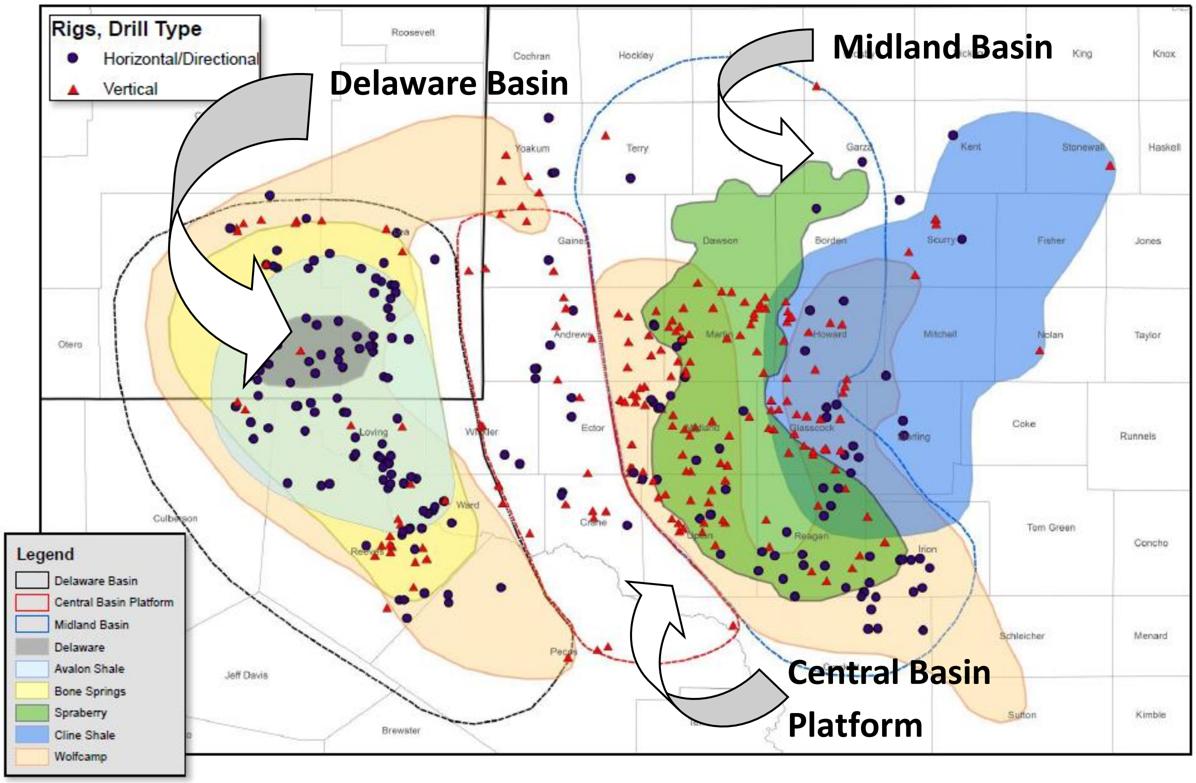



Figure 3.7: Rig Drill Type on the Different Plays (Source: Tudor, Pickering, Holt & Co Research)

**Drilling/Completion Technology and Production Trends**

Permian Basin completion efficiencies have dramatically improved with the application of new technologies. As seen in Figures 4.0 and 4.1, efficiencies, which are defined as initial oil rate per well drilled, have improved since 2010. With the recent increase in horizontal drilling permits, as shown in Figures 4.4 and 4.5, and increased well productivity as detailed in Appendix E, we expect continued increases in efficiency and activity levels in the Permian Basin.

In addition to productivity, technology is enabling operators to be more efficient. As shown in Figures 4.2 and 4.3, time to drill horizontal wells has been drastically reduced resulting in substantial cost savings. More importantly, is that the Permian Basin is the least mature relative to horizontal drilling experience. Thus, it would be reasonable to assume the Permian Basin has great potential for further increases in drilling efficiency. With the recent increase in horizontal drilling permits, as shown in Figures 4.4 and 4.5, and increased well productivity in seen in Appendix E, we expect continued increases in efficiency and activity levels in the Permian Basin.

Permian Basin technological trends include the following (Thomas W. Engler et al, 2011):

- Horizontal drilling
- Changes in hydraulic fracturing technology
- Slick -water fracing,
- Changes in fluid type and amount,
- Increased use of 3-D seismic surveys,
- Downhole commingling/Multi-zone completions,
- Multiple well pads, and
- Changes in rules that allow for down-spacing of particular fields to tap undrained areas in existing pools.

The number of drilling permits acquired is an important indicator of likely drilling activity to be carried out in the region of interest. This influences the future production of oil and gas in that county or region. A strong increase in drilling activity will often result in higher future production levels. Moreover, technology shifts and newly developed plays have even a greater impact on production and level of activity.

Detailed analysis of each Texas Railroad district and south east New Mexico is shown in Appendix E.

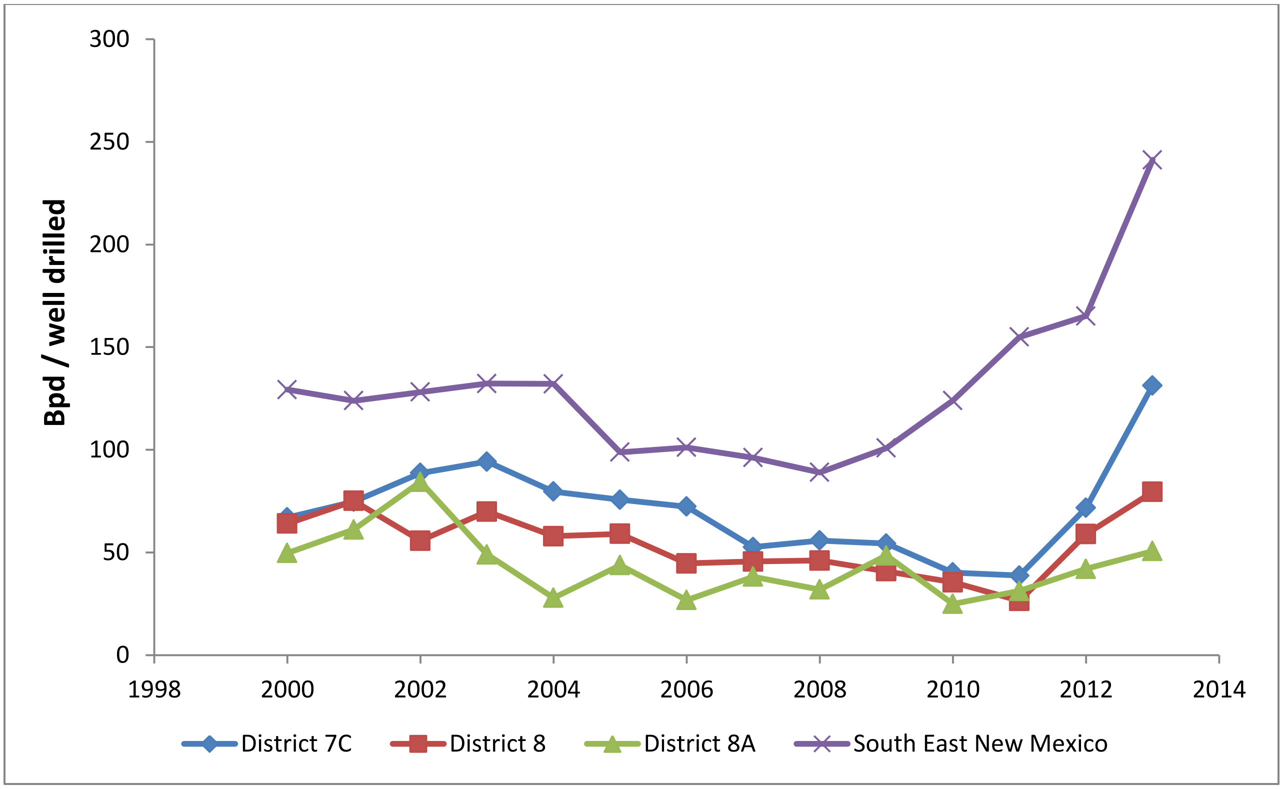



Figure 4.0: Drilling/Completions Efficiency Comparison for Different District in Texas and South East New Mexico (Source: DrillingInfo)

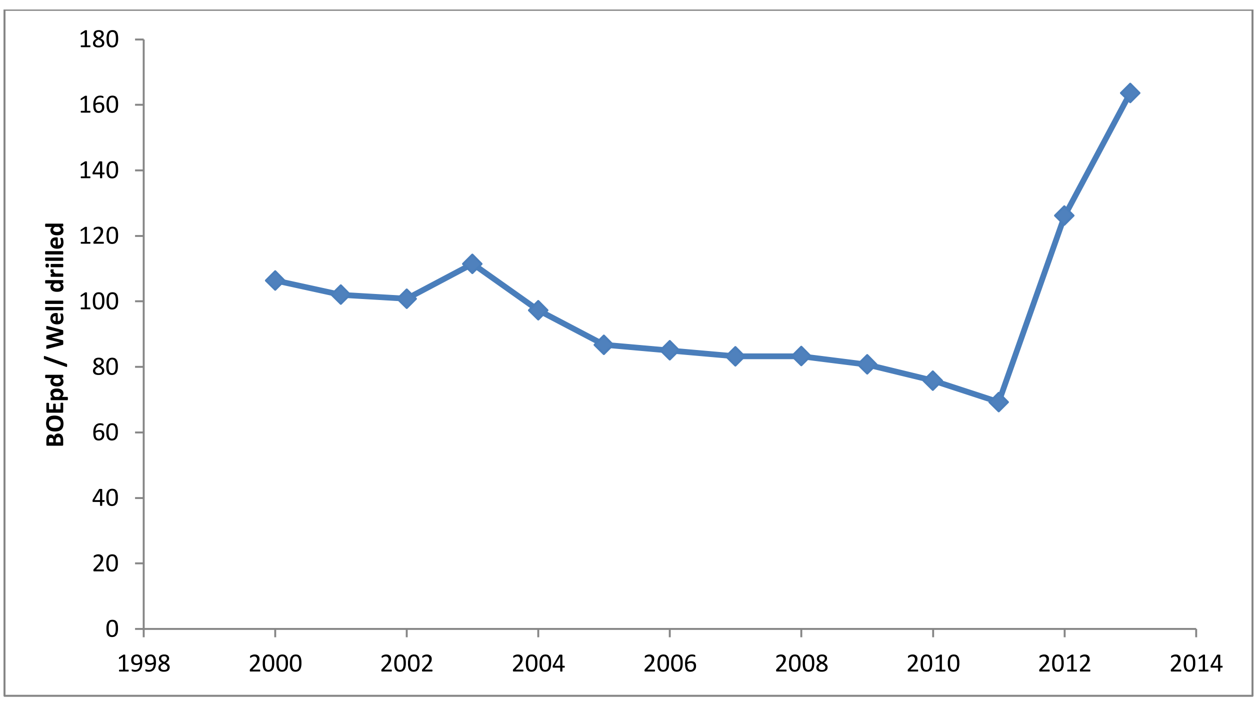



Figure 4.1: Drilling/Completions Efficiency Comparison for the Entire Permian Basin (Source: DrillingInfo)

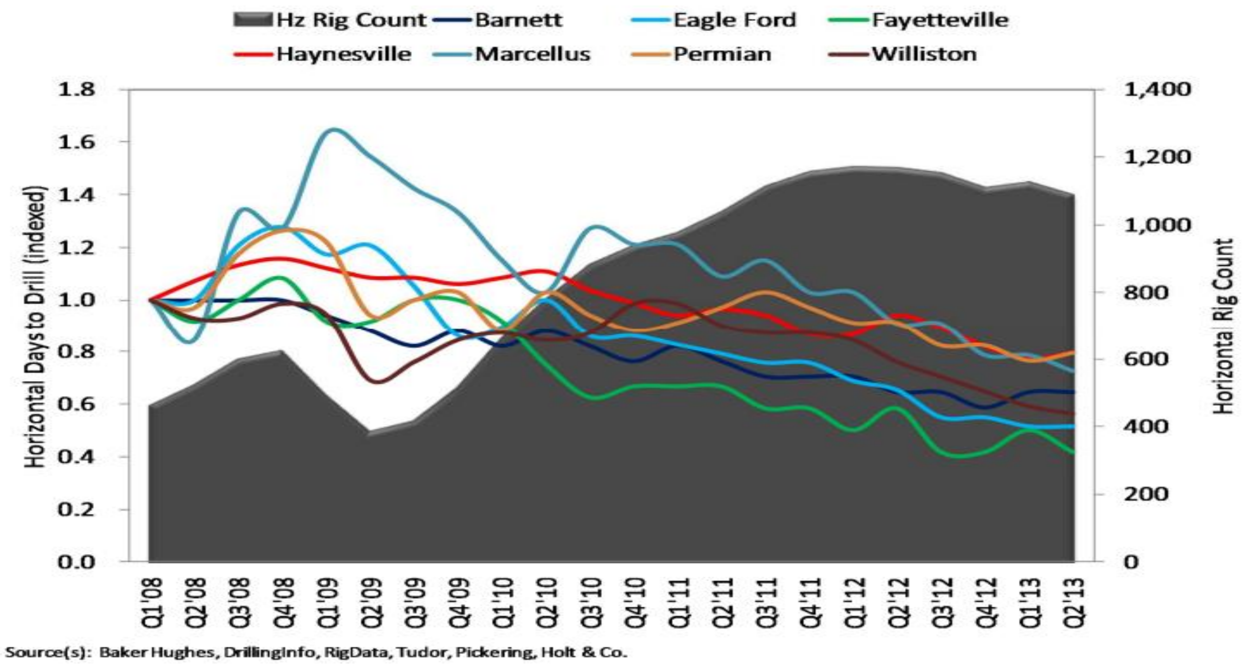



Figure 4.2: Horizontal Drilling Efficiency Comparison for Different Basins (Source: Tudor, Pickering, Holt & Co Research)

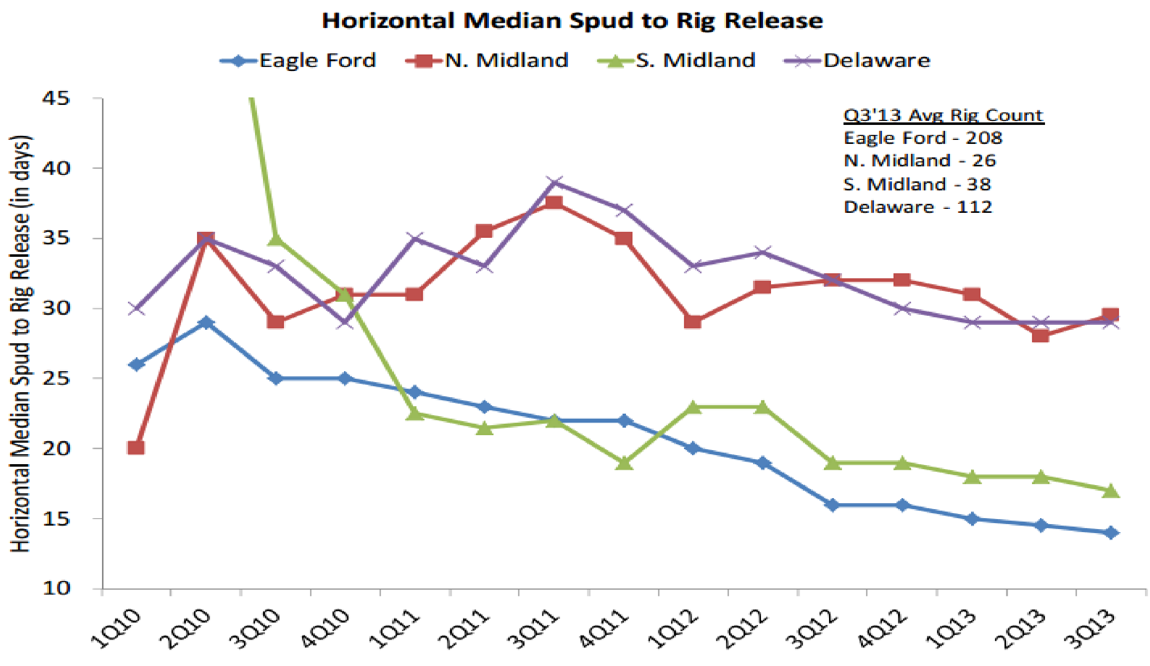



Figure 4.3: Horizontal Median Spud to Rig Release Comparison between Eagle Ford and Plays in the Permian Basin (Source: Tudor, Pickering, Holt & Co Research)

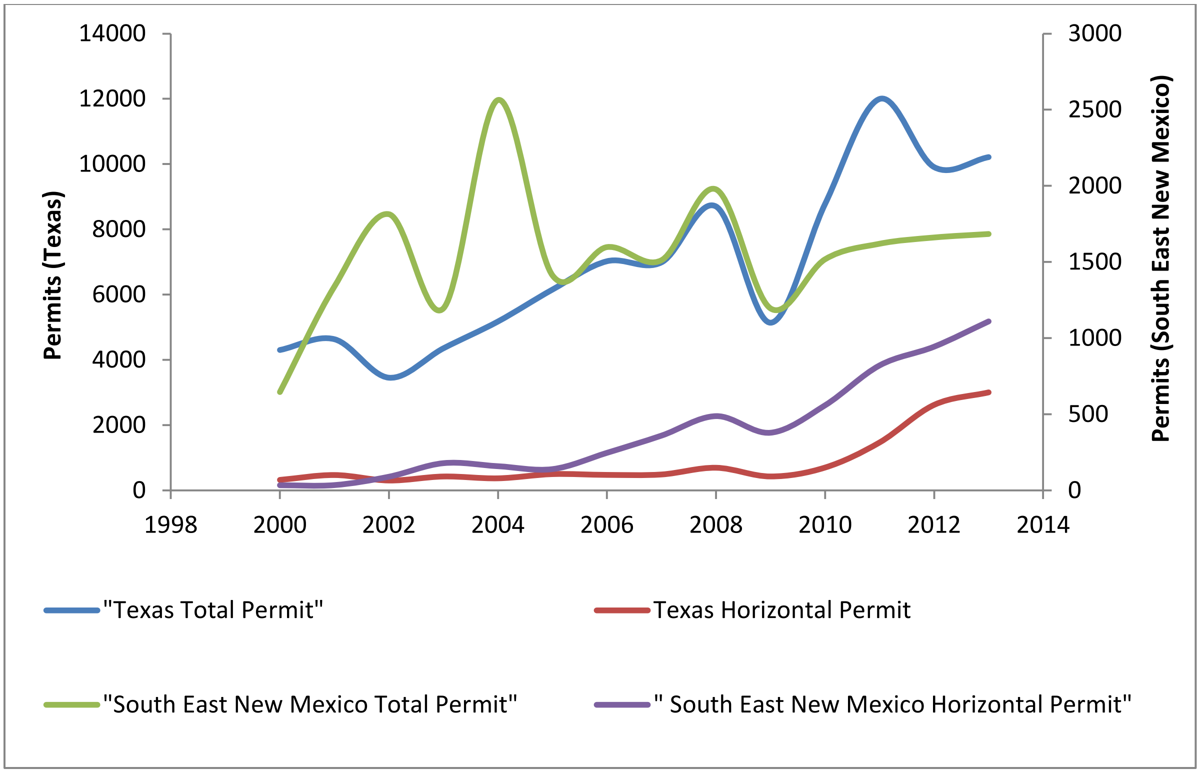



Figure 4.4: Drilling Permit vs. Time Plot for Texas and South East New Mexico

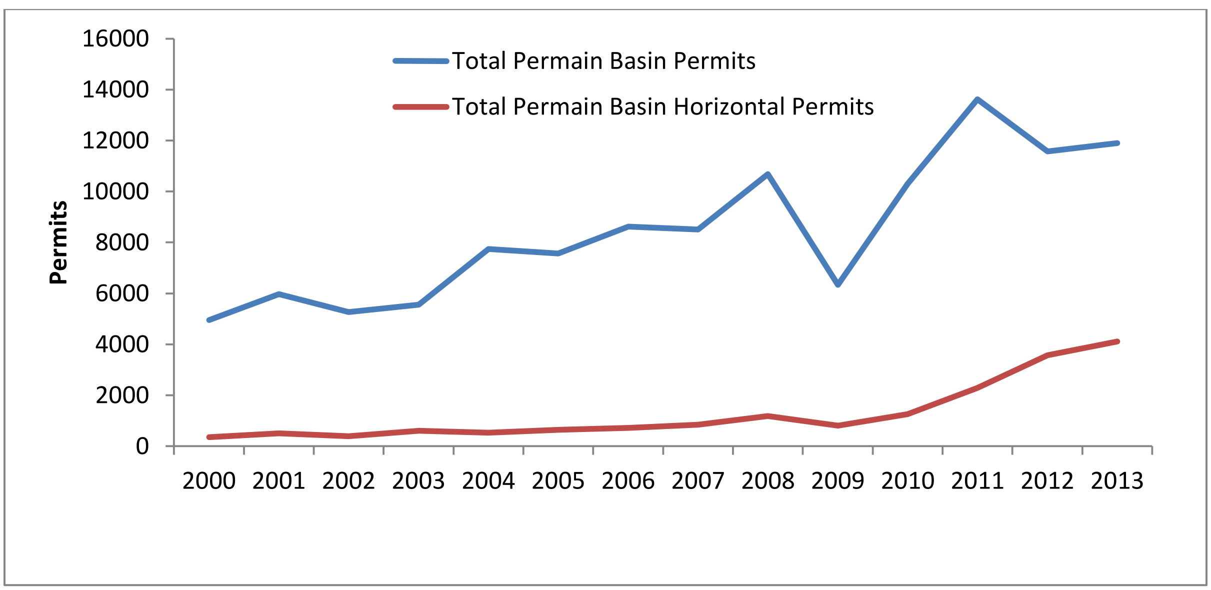



Figure 4.5: Drilling Permit vs. Time Plot for the Entire Permian Basin

**Economic Impacts from the Production of Oil and Gas in the Permian Basin: 2013**

The myriad of activities associated with the drilling for and extraction of oil and gas in the Permian Basin entails a number of upstream and some midstream level businesses. These activities create significant economic benefits by creating and sustaining jobs, income, value added and output. In addition, the industry provides important tax revenues that benefit the citizens of the region and state.

A set of economic models, referred to as *input-output* (I-O) models by economists, was constructed to measure the economic impact that the oil and gas industry has on the Permian Basin economy. The basis of an economic impact model is the spending patterns of individuals and businesses in the region. In particular, expenditures by firms engaged in the oil and gas industry on equipment and supplies occur within the region and elsewhere, while oil and gas employees tend to spend the majority of their income more locally. Economists generally categorize the economic impacts from these expenditures into two types of effects: direct and secondary. Direct effects represent those expenditures within the region of the industry being studied. Direct effects lead to secondary effects in the form of business-to-business transactions in the region (e.g., to restore inventory) referred to as indirect effects and also to new income in the form of wages and salaries, rent and interest payments, payments to proprietors and stockholders for investment, etc. also known as induced effects. For purposes of this study, economic output (i.e., gross revenues) refers to the value of all industrial production (i.e., mining, services, retail trade, manufacturing, etc.) in a region, following the convention used by the U.S. Bureau of Labor Statistics (BLS) and Bureau of Economic Analysis (BEA), jobs are defined as the average annual number of jobs in a sector, industry, or region, while labor income consists of all forms of employment income, including employee compensation (wages and benefits) and proprietor income, and value added indicates the addition to Gross State Product.

The regional economic model identifies the "linkages" within the economy that exist between businesses (or enterprises) and other businesses, and businesses (or enterprises) and final consumers. From the regional economic model, a set of industrial sector "economic multipliers" unique to the regional economy are calculated. These multipliers are used to provide a comprehensive assessment of the economic impact of the oil and gas industry. Specifically, the economic impact analysis provides information as to the number of jobs created and sustained by the ongoing operation of the industry, the income added to the local economy from the industry's operations, which includes household income or earnings, and the total output (in dollars) that industry contributes to the economy.

For purposes of this report, the economic models were constructed for the Permian Basin region, the New Mexico portion of the Permian Basin, the Texas portion of the Permian Basin, and for each individual county in the Permian Basin region, for a total of 51 models constructed. The list of counties considered to be in the Permian Basin for this study is contained in the appendix.

To estimate the economic impact of the Permian Basin's oil and gas industry in 2013 we follow the convention of first estimating the production of oil and gas. Production data generally come from the Railroad Commission of Texas and the New Mexico Oil Conservation Division. Price information is from the U.S. Energy Information Agency (EIA) and used to quantify revenues associated with the extraction of oil and gas. Information on costs associated with other core oil and gas activities was obtained from several sources including recent annual reports of major operators in the Permian Basin and the EIA (trends on operating and drilling costs). The analysis was conducted using the IMPLAN Version 3.0 software package. 2011 values were updated to reflect the information obtained and estimated for 2013. The conversion to 2013 values was accomplished through a set of extrapolations (economic time series analysis) and validated using the production, drilling and engineering-related data. For purposes of this study, and following convention of economic impact research, the core sectors were defined as oil and gas extraction, drilling for oil and gas, and support activities for oil and gas operations. Non-core related sectors include economic activity related to transportation (e.g., by pipeline, truck and rail), specific oil and gas manufactured parts and machinery, refining, etc. While these activities are imperative for the proper and efficient operation of the industry, they are generally labelled non-core in economic impact studies for the reason that they would not exist if it were not for the drilling and producing of oil and gas.

The following table summarizes the 2013 impacts for the entire Permian Basin region. There were nearly a quarter million jobs in the oil and gas industry in 2013 and over $95 billion of production value (i.e., commodity price multiplied by volume of production). These direct impacts generated and/or sustained over a half million of the jobs in the Permian Basin. Moreover, the industry generated almost $137.8 billion in output, and contributed more than $71 billion in total gross state product (across Texas and New Mexico), i.e., value added. The existence of the oil and gas industry in the Permian Basin generates substantial economic activity and economic benefits to both New Mexico and Texas.

**Permian Basin**

| *Impact Type* | *Employment* | *Labor Income* | *Total Value Added* | *Output* |
|---|---|---|---|---|
| Direct Effect | 244,074 | 19,160,541,128 | 47,442,572,577 | 95,080,000,000 |
| Indirect Effect | 155,766 | 7,537,767,130 | 13,459,362,924 | 25,394,643,742 |
| Induced Effect | 146,376 | 5,064,342,129 | 10,215,221,057 | 17,305,934,221 |
| Total Effect | 546,216 | 31,762,650,388 | 71,117,156,558 | 137,780,577,963 |

Note: Labor income, total value added and output are measured in current dollars ($).

The oil and gas activity in the Permian Basin impacts various sectors differently. The following table illustrates the impacts for the top ten sectors in the Permian Basin, ranked by employment. The values clearly illustrate the demand for workers in sectors related to construction, engineering and design, food, wholesale trade, and financial-related activities. These sectors benefit greatly from the presence of the oil and gas industry across the Permian Basin.

| *Sector* | *Total Employment* |
|---|---|
| Support activities for oil and gas operations | 130,307 |
| Extraction of oil and natural gas | 87,121 |
| Drilling oil and gas wells | 36,176 |
| Maintenance and repair construction of nonresidential structures | 31,394 |
| Food services and drinking establishments | 26,137 |
| Architectural, engineering, and related services | 17,043 |
| Wholesale trade businesses | 11,608 |
| Securities, commodity contracts, investments, and related activities | 8,728 |
| Civic, social, professional, and similar organizations | 8,688 |
| Monetary authorities and depository credit intermediation activities | 8,411 |

The following table summarizes the 2013 impacts for the Texas portion of the Permian Basin region. There were over 190,000 jobs in the oil and gas industry in 2013 and $77.9 billion of production value. These direct impacts generated and/or sustained over 444,000 of the jobs in the Texas portion of the Permian Basin. Moreover, the industry generated $113.6 billion in output, and contributed more than $60.2 billion in total gross state product (across Texas), i.e., value added. The existence of the oil and gas industry in the Texas Portion of the Permian Basin generates substantial economic activity and economic benefits to this area.

**Permian Basin - Texas**

| *Impact Type* | *Employment* | *Labor Income* | *Total Value Added* | *Output* |
|---|---|---|---|---|
| Direct Effect | 190,714 | 15,706,086,363 | 40,086,447,398 | 77,880,000,000 |
| Indirect Effect | 130,728 | 6,238,975,069 | 11,405,088,258 | 21,103,160,550 |
| Induced Effect | 123,311 | 4,297,026,885 | 8,724,073,294 | 14,646,352,568 |
| Total Effect | 444,753 | 26,242,088,318 | 60,215,608,950 | 113,629,513,118 |

Note: Labor income, total value added and output are measured in current dollars ($).

The following table summarizes the 2013 impacts for the New Mexico portion of the Permian Basin region. There were over 53,000 jobs in the oil and gas industry in 2013 and $17.2 billion of production value. These direct impacts generated and/or sustained over 94,000 of the jobs in the New Mexico portion of the Permian Basin. Moreover, the industry generated $22.7 billion in output, and contributed more than $10.2 billion in total gross state product (across New Mexico), i.e., value added. The existence of the oil and gas industry in the New Mexico Portion of the Permian Basin generates substantial economic activity and economic benefits to this area.

**Permian Basin - New Mexico**

| *Impact Type* | *Employment* | *Labor Income* | *Total Value Added* | *Output* |
|---|---|---|---|---|
| Direct Effect | 53,496 | 3,462,805,294 | 7,351,417,620 | 17,200,000,000 |
| Indirect Effect | 21,441 | 1,063,371,089 | 1,619,372,471 | 3,311,307,057 |
| Induced Effect | 19,834 | 642,904,720 | 1,254,387,233 | 2,185,253,445 |
| Total Effect | 94,771 | 5,169,081,103 | 10,225,177,324 | 22,696,560,502 |

Note: Labor income, total value added and output are measured in current dollars ($).

The following table summarizes the economic impacts of the Permian Basin's oil and gas industry by county. Texas counties are listed first, followed by New Mexico counties. Labor income, total value added and output are measure in current dollars ($).

**Texas County Impacts**

**Andrews**

| *Impact Type* | *Employment* | *Labor Income* | *Total Value Added* | *Output* |
|---|---|---|---|---|
| Direct Effect | 6,870 | 507,552,965 | 1,025,804,304 | 2,039,700,000 |
| Indirect Effect | 1,858 | 98,294,600 | 165,435,994 | 291,913,704 |
| Induced Effect | 1,578 | 52,695,954 | 125,814,301 | 198,192,179 |
| Total Effect | 10,306 | 658,543,520 | 1,317,054,599 | 2,529,805,884 |

**Cochran**

| *Impact Type* | *Employment* | *Labor Income* | *Total Value Added* | *Output* |
|---|---|---|---|---|
| Direct Effect | 171 | 8,567,977 | 48,804,058 | 86,050,000 |
| Indirect Effect | 31 | 1,038,820 | 2,926,715 | 5,524,247 |
| Induced Effect | 18 | 614,832 | 1,707,044 | 2,666,069 |
| Total Effect | 219 | 10,221,630 | 53,437,817 | 94,240,316 |

**Coke**

| *Impact Type* | *Employment* | *Labor Income* | *Total Value Added* | *Output* |
|---|---|---|---|---|
| Direct Effect | 193 | 5,848,334 | 47,092,995 | 87,090,000 |
| Indirect Effect | 125 | 2,450,888 | 4,880,094 | 13,097,185 |
| Induced Effect | 21 | 417,601 | 1,438,521 | 2,689,884 |
| Total Effect | 339 | 8,716,823 | 53,411,610 | 102,877,069 |

**Crane**

| *Impact Type* | *Employment* | *Labor Income* | *Total Value Added* | *Output* |
|---|---|---|---|---|
| Direct Effect | 2,332 | 217,407,431 | 399,495,982 | 726,770,000 |
| Indirect Effect | 690 | 22,349,152 | 40,540,546 | 92,876,380 |
| Induced Effect | 613 | 17,789,207 | 46,655,433 | 75,287,073 |
| Total Effect | 3,634 | 257,545,790 | 486,691,961 | 894,933,452 |

**Crosby**

| *Impact Type* | *Employment* | *Labor Income* | *Total Value Added* | *Output* |
|---|---|---|---|---|
| Direct Effect | 93 | 3,727,889 | 27,438,481 | 48,640,000 |
| Indirect Effect | 23 | 644,822 | 3,134,338 | 4,785,379 |
| Induced Effect | 11 | 422,145 | 1,011,265 | 1,640,190 |
| Total Effect | 127 | 4,794,855 | 31,584,084 | 55,065,568 |

**Culberson**

| *Impact Type* | *Employment* | *Labor Income* | *Total Value Added* | *Output* |
|---|---|---|---|---|
| Direct Effect | 40 | 32,116 | 2,374,923 | 11,580,000 |
| Indirect Effect | 28 | 581,809 | 1,384,264 | 2,704,197 |
| Induced Effect | 2 | 37,375 | 118,307 | 206,018 |
| Total Effect | 70 | 651,300 | 3,877,493 | 14,490,216 |

**Dawson**

| *Impact Type* | *Employment* | *Labor Income* | *Total Value Added* | *Output* |
|---|---|---|---|---|
| Direct Effect | 1,166 | 71,533,278 | 245,417,108 | 479,410,000 |
| Indirect Effect | 438 | 14,770,026 | 30,441,034 | 58,364,026 |
| Induced Effect | 316 | 8,005,428 | 22,445,258 | 35,904,562 |
| Total Effect | 1,919 | 94,308,732 | 298,303,400 | 573,678,588 |

**Dickens**

| *Impact Type* | *Employment* | *Labor Income* | *Total Value Added* | *Output* |
|---|---|---|---|---|
| Direct Effect | 70 | 1,587,170 | 19,321,938 | 35,180,000 |
| Indirect Effect | 10 | 358,375 | 1,252,019 | 2,313,979 |
| Induced Effect | 5 | 85,266 | 315,139 | 575,705 |
| Total Effect | 84 | 2,030,811 | 20,889,097 | 38,069,684 |

**Ector**

| *Impact Type* | *Employment* | *Labor Income* | *Total Value Added* | *Output* |
|---|---|---|---|---|
| Direct Effect | 34,255 | 3,119,807,793 | 6,629,516,105 | 13,199,000,000 |
| Indirect Effect | 17,317 | 896,677,543 | 1,527,839,414 | 2,506,761,149 |
| Induced Effect | 17,057 | 600,079,518 | 1,237,851,908 | 1,934,553,175 |
| Total Effect | 68,629 | 4,616,564,855 | 9,395,207,427 | 17,640,314,324 |

**Edwards**

| *Impact Type* | *Employment* | *Labor Income* | *Total Value Added* | *Output* |
|---|---|---|---|---|
| Direct Effect | 40 | 444,604 | 2,693,246 | 11,580,000 |
| Indirect Effect | 30 | 530,966 | 803,903 | 2,284,100 |
| Induced Effect | 2 | 65,492 | 172,648 | 276,209 |
| Total Effect | 72 | 1,041,062 | 3,669,797 | 14,140,309 |

**Floyd**

| *Impact Type* | *Employment* | *Labor Income* | *Total Value Added* | *Output* |
|---|---|---|---|---|
| Direct Effect | 1 | 213,190 | 452,771 | 667,000 |
| Indirect Effect | 0 | 13,078 | 48,759 | 71,508 |
| Induced Effect | 1 | 14,693 | 41,357 | 69,150 |
| Total Effect | 2 | 240,960 | 542,887 | 807,658 |

**Gaines**

| *Impact Type* | *Employment* | *Labor Income* | *Total Value Added* | *Output* |
|---|---|---|---|---|
| Direct Effect | 2,550 | 276,144,227 | 670,180,225 | 1,266,400,000 |
| Indirect Effect | 1,226 | 39,864,186 | 68,167,779 | 138,717,744 |
| Induced Effect | 831 | 24,038,072 | 63,589,052 | 101,581,383 |
| Total Effect | 4,607 | 340,046,485 | 801,937,056 | 1,506,699,127 |

**Glasscock**

| *Impact Type* | *Employment* | *Labor Income* | *Total Value Added* | *Output* |
|---|---|---|---|---|
| Direct Effect | 227 | 1,512,472 | 14,382,947 | 65,170,000 |
| Indirect Effect | 31 | 1,088,576 | 1,645,313 | 4,363,445 |
| Induced Effect | 3 | 77,267 | 250,161 | 439,870 |
| Total Effect | 261 | 2,678,315 | 16,278,421 | 69,973,315 |

**Hale**

| *Impact Type* | *Employment* | *Labor Income* | *Total Value Added* | *Output* |
|---|---|---|---|---|
| Direct Effect | 86 | 10,486,842 | 20,538,209 | 35,500,000 |
| Indirect Effect | 50 | 1,564,327 | 2,524,812 | 5,686,452 |
| Induced Effect | 57 | 1,634,874 | 3,479,365 | 5,853,241 |
| Total Effect | 193 | 13,686,043 | 26,542,387 | 47,039,692 |

**Hockley**

| *Impact Type* | *Employment* | *Labor Income* | *Total Value Added* | *Output* |
|---|---|---|---|---|
| Direct Effect | 8,986 | 641,989,590 | 2,030,888,259 | 4,310,000,000 |
| Indirect Effect | 3,174 | 152,418,706 | 279,143,973 | 527,098,420 |
| Induced Effect | 2,645 | 78,500,956 | 179,719,247 | 301,932,605 |
| Total Effect | 14,805 | 872,909,252 | 2,489,751,480 | 5,139,031,024 |

**Howard**

| *Impact Type* | *Employment* | *Labor Income* | *Total Value Added* | *Output* |
|---|---|---|---|---|
| Direct Effect | 5,245 | 264,565,536 | 999,039,058 | 2,235,700,000 |
| Indirect Effect | 1,813 | 69,309,737 | 140,920,980 | 283,839,246 |
| Induced Effect | 1,360 | 43,827,128 | 102,560,466 | 171,272,198 |
| Total Effect | 8,418 | 377,702,401 | 1,242,520,503 | 2,690,811,444 |

**Irion**

| *Impact Type* | *Employment* | *Labor Income* | *Total Value Added* | *Output* |
|---|---|---|---|---|
| Direct Effect | 1,097 | 73,461,267 | 188,679,272 | 426,630,000 |
| Indirect Effect | 283 | 6,610,326 | 13,813,166 | 38,524,793 |
| Induced Effect | 100 | 2,524,223 | 8,592,258 | 15,215,896 |
| Total Effect | 1,480 | 82,595,816 | 211,084,696 | 480,370,690 |

**Jeff Davis**

| *Impact Type* | *Employment* | *Labor Income* | *Total Value Added* | *Output* |
|---|---|---|---|---|
| Direct Effect | 70 | 331,955 | 4,391,139 | 20,340,000 |
| Indirect Effect | 21 | 650,944 | 1,396,276 | 2,945,722 |
| Induced Effect | 3 | 69,252 | 215,680 | 360,878 |
| Total Effect | 93 | 1,052,152 | 6,003,096 | 23,646,600 |

**Kent**

| *Impact Type* | *Employment* | *Labor Income* | *Total Value Added* | *Output* |
|---|---|---|---|---|
| Direct Effect | 74 | 5,722,421 | 7,196,439 | 15,300,000 |
| Indirect Effect | 20 | 200,119 | 700,883 | 2,483,292 |
| Induced Effect | 11 | 216,128 | 907,659 | 1,566,310 |
| Total Effect | 105 | 6,138,668 | 8,804,981 | 19,349,603 |

**Kimble**

| *Impact Type* | *Employment* | *Labor Income* | *Total Value Added* | *Output* |
|---|---|---|---|---|
| Direct Effect | 86 | 1,048,277 | 5,634,157 | 24,000,000 |
| Indirect Effect | 73 | 1,851,696 | 2,960,486 | 6,882,279 |
| Induced Effect | 11 | 269,420 | 691,214 | 1,134,236 |
| Total Effect | 170 | 3,169,393 | 9,285,857 | 32,016,515 |

**Lamb**

| *Impact Type* | *Employment* | *Labor Income* | *Total Value Added* | *Output* |
|---|---|---|---|---|
| Direct Effect | 203 | 5,035,912 | 56,754,397 | 103,000,000 |
| Indirect Effect | 105 | 3,178,154 | 6,239,561 | 12,622,231 |
| Induced Effect | 25 | 651,079 | 1,908,823 | 3,109,292 |
| Total Effect | 332 | 8,865,145 | 64,902,782 | 118,731,523 |

**Loving**

| *Impact Type* | *Employment* | *Labor Income* | *Total Value Added* | *Output* |
|---|---|---|---|---|
| Direct Effect | 60 | 25,307 | 3,529,955 | 17,300,000 |
| Indirect Effect | 10 | 269,902 | 2,932,187 | 4,203,221 |
| Induced Effect | 0 | 2,360 | 13,474 | 23,239 |
| Total Effect | 71 | 297,569 | 6,475,616 | 21,526,459 |

**Lubbock**

| *Impact Type* | *Employment* | *Labor Income* | *Total Value Added* | *Output* |
|---|---|---|---|---|
| Direct Effect | 5,705 | 113,783,050 | 1,187,776,431 | 2,314,300,000 |
| Indirect Effect | 5,976 | 251,523,435 | 450,127,859 | 810,537,296 |
| Induced Effect | 2,637 | 94,712,316 | 181,383,295 | 304,162,564 |
| Total Effect | 14,319 | 460,018,801 | 1,819,287,585 | 3,428,999,859 |

**Lynn**

| *Impact Type* | *Employment* | *Labor Income* | *Total Value Added* | *Output* |
|---|---|---|---|---|
| Direct Effect | 67 | 151,969 | 4,036,675 | 19,300,000 |
| Indirect Effect | 23 | 377,820 | 937,609 | 2,221,926 |
| Induced Effect | 1 | 23,622 | 91,332 | 159,879 |
| Total Effect | 91 | 553,410 | 5,065,617 | 21,681,806 |

**Martin**

| *Impact Type* | *Employment* | *Labor Income* | *Total Value Added* | *Output* |
|---|---|---|---|---|
| Direct Effect | 353 | 29,130,728 | 108,030,144 | 183,080,000 |
| Indirect Effect | 126 | 6,196,732 | 8,984,536 | 15,989,353 |
| Induced Effect | 103 | 2,721,974 | 7,169,160 | 12,053,629 |
| Total Effect | 582 | 38,049,435 | 124,183,839 | 211,122,982 |

**Midland**

| *Impact Type* | *Employment* | *Labor Income* | *Total Value Added* | *Output* |
|---|---|---|---|---|
| Direct Effect | 67,867 | 7,203,273,090 | 17,687,942,264 | 31,899,000,000 |
| Indirect Effect | 45,699 | 2,415,746,033 | 4,071,252,600 | 6,784,509,114 |
| Induced Effect | 36,324 | 1,354,959,307 | 2,586,321,716 | 4,093,269,566 |
| Total Effect | 149,889 | 10,973,978,430 | 24,345,516,580 | 42,776,778,680 |

**Mitchell**

| *Impact Type* | *Employment* | *Labor Income* | *Total Value Added* | *Output* |
|---|---|---|---|---|
| Direct Effect | 753 | 39,563,668 | 155,794,074 | 300,300,000 |
| Indirect Effect | 200 | 5,860,324 | 10,376,508 | 22,773,747 |
| Induced Effect | 112 | 2,809,405 | 7,479,279 | 12,351,489 |
| Total Effect | 1,065 | 48,233,398 | 173,649,861 | 335,425,236 |

**Motley**

| *Impact Type* | *Employment* | *Labor Income* | *Total Value Added* | *Output* |
|---|---|---|---|---|
| Direct Effect | 23 | 305,142 | 1,427,383 | 6,030,000 |
| Indirect Effect | 17 | 355,347 | 557,499 | 1,481,947 |
| Induced Effect | 2 | 33,736 | 115,095 | 197,923 |
| *Total Effect* | *43* | *694,226* | *2,099,978* | *7,709,871* |

**Nolan**

| *Impact Type* | *Employment* | *Labor Income* | *Total Value Added* | *Output* |
|---|---|---|---|---|
| Direct Effect | 1,887 | 77,143,888 | 163,608,549 | 411,880,000 |
| Indirect Effect | 825 | 25,812,532 | 48,003,074 | 92,585,109 |
| Induced Effect | 461 | 12,243,693 | 28,228,095 | 46,485,331 |
| Total Effect | 3,172 | 115,200,114 | 239,839,717 | 550,950,440 |

**Pecos**

| *Impact Type* | *Employment* | *Labor Income* | *Total Value Added* | *Output* |
|---|---|---|---|---|
| Direct Effect | 5,734 | 491,466,938 | 703,446,744 | 1,382,100,000 |
| Indirect Effect | 1,104 | 42,371,647 | 81,248,020 | 153,856,546 |
| Induced Effect | 1,737 | 46,466,997 | 115,028,414 | 189,568,905 |
| Total Effect | 8,575 | 580,305,582 | 899,723,178 | 1,725,525,451 |

**Reagan**

| *Impact Type* | *Employment* | *Labor Income* | *Total Value Added* | *Output* |
|---|---|---|---|---|
| Direct Effect | 2,773 | 133,236,549 | 329,298,656 | 717,600,000 |
| Indirect Effect | 417 | 16,195,062 | 30,911,645 | 62,211,615 |
| Induced Effect | 155 | 4,052,662 | 13,731,605 | 23,134,880 |
| Total Effect | 3,346 | 153,484,273 | 373,941,906 | 802,946,496 |

**Reeves**

| *Impact Type* | *Employment* | *Labor Income* | *Total Value Added* | *Output* |
|---|---|---|---|---|
| Direct Effect | 1,480 | 98,943,162 | 139,532,380 | 307,600,000 |
| Indirect Effect | 276 | 8,205,098 | 20,298,206 | 37,970,700 |
| Induced Effect | 343 | 8,220,097 | 24,109,851 | 39,787,042 |
| Total Effect | 2,099 | 115,368,358 | 183,940,437 | 385,357,742 |

**Scurry**

| *Impact Type* | *Employment* | *Labor Income* | *Total Value Added* | *Output* |
|---|---|---|---|---|
| Direct Effect | 6,575 | 517,122,846 | 1,007,369,620 | 1,998,600,000 |
| Indirect Effect | 2,087 | 107,858,267 | 178,280,725 | 307,572,411 |
| Induced Effect | 1,907 | 58,841,632 | 138,990,975 | 218,853,904 |
| Total Effect | 10,569 | 683,822,745 | 1,324,641,320 | 2,525,026,315 |

**Sterling**

| *Impact Type* | *Employment* | *Labor Income* | *Total Value Added* | *Output* |
|---|---|---|---|---|
| Direct Effect | 392 | 40,550,699 | 125,628,573 | 207,500,000 |
| Indirect Effect | 152 | 4,339,943 | 9,946,356 | 18,843,863 |
| Induced Effect | 81 | 1,608,802 | 6,843,095 | 10,787,930 |
| Total Effect | 625 | 46,499,444 | 142,418,024 | 237,131,793 |

**Terry**

| *Impact Type* | *Employment* | *Labor Income* | *Total Value Added* | *Output* |
|---|---|---|---|---|
| Direct Effect | 1,894 | 190,531,542 | 379,791,469 | 809,630,000 |
| Indirect Effect | 418 | 16,197,002 | 28,234,955 | 57,482,068 |
| Induced Effect | 732 | 20,973,245 | 46,356,923 | 76,624,213 |
| Total Effect | 3,044 | 227,701,789 | 454,383,346 | 943,736,281 |

**Tom Green**

| *Impact Type* | *Employment* | *Labor Income* | *Total Value Added* | *Output* |
|---|---|---|---|---|
| Direct Effect | 11,170 | 299,733,806 | 2,198,247,533 | 5,188,000,000 |
| Indirect Effect | 7,792 | 277,399,611 | 552,964,821 | 1,030,567,084 |
| Induced Effect | 3,368 | 114,574,191 | 226,600,965 | 374,660,103 |
| Total Effect | 22,329 | 691,707,608 | 2,977,813,319 | 6,593,227,187 |

**Upton**

| *Impact Type* | *Employment* | *Labor Income* | *Total Value Added* | *Output* |
|---|---|---|---|---|
| Direct Effect | 2,384 | 171,208,914 | 497,554,358 | 931,400,000 |
| Indirect Effect | 534 | 23,251,966 | 45,096,300 | 91,611,446 |
| Induced Effect | 323 | 8,696,957 | 27,554,786 | 46,891,837 |
| Total Effect | 3,241 | 203,157,836 | 570,205,444 | 1,069,903,283 |

**Val Verde**

| *Impact Type* | *Employment* | *Labor Income* | *Total Value Added* | *Output* |
|---|---|---|---|---|
| Direct Effect | 1,091 | 17,977,963 | 76,343,745 | 309,700,000 |
| Indirect Effect | 745 | 19,374,187 | 32,164,609 | 71,873,678 |
| Induced Effect | 160 | 4,485,087 | 10,012,555 | 16,145,297 |
| Total Effect | 1,996 | 41,837,237 | 118,520,909 | 397,718,976 |

**Ward**

| *Impact Type* | *Employment* | *Labor Income* | *Total Value Added* | *Output* |
|---|---|---|---|---|
| Direct Effect | 5,565 | 393,839,173 | 884,451,598 | 1,876,100,000 |
| Indirect Effect | 2,211 | 100,766,270 | 155,715,145 | 304,099,742 |
| Induced Effect | 1,129 | 33,679,633 | 92,226,024 | 147,686,017 |
| Total Effect | 8,906 | 528,285,076 | 1,132,392,767 | 2,327,885,759 |

**Winkler**

| *Impact Type* | *Employment* | *Labor Income* | *Total Value Added* | *Output* |
|---|---|---|---|---|
| Direct Effect | 3,501 | 226,009,852 | 570,920,638 | 1,096,700,000 |
| Indirect Effect | 799 | 35,629,279 | 79,930,054 | 150,739,125 |
| Induced Effect | 621 | 15,456,004 | 53,388,130 | 87,645,655 |
| Total Effect | 4,920 | 277,095,135 | 704,238,821 | 1,335,084,781 |

**Yoakum**

| *Impact Type* | *Employment* | *Labor Income* | *Total Value Added* | *Output* |
|---|---|---|---|---|
| Direct Effect | 4,652 | 386,553,126 | 957,973,049 | 1,729,700,000 |
| Indirect Effect | 1,255 | 66,216,977 | 120,816,073 | 218,617,847 |
| Induced Effect | 839 | 25,054,797 | 68,876,835 | 109,494,413 |
| Total Effect | 6,746 | 477,824,900 | 1,147,665,956 | 2,057,812,260 |

Note: Labor income, total value added and output are measured in current dollars ($).

**New Mexico County Impacts**

**Chaves**

| *Impact Type* | *Employment* | *Labor Income* | *Total Value Added* | *Output* |
|---|---|---|---|---|
| Direct Effect | 4,445 | 137,967,873 | 654,007,048 | 1,553,650,000 |
| Indirect Effect | 2,099 | 86,768,679 | 126,548,029 | 240,544,264 |
| Induced Effect | 1,235 | 40,106,245 | 74,442,130 | 123,013,121 |
| Total Effect | 7,780 | 264,842,798 | 854,997,207 | 1,917,207,385 |

**Eddy**

| *Impact Type* | *Employment* | *Labor Income* | *Total Value Added* | *Output* |
|---|---|---|---|---|
| Direct Effect | 17,988 | 1,287,876,681 | 3,043,729,349 | 6,861,000,000 |
| Indirect Effect | 7,108 | 390,585,270 | 602,240,095 | 1,189,621,495 |
| Induced Effect | 6,620 | 230,431,857 | 437,017,835 | 748,505,885 |
| Total Effect | 31,716 | 1,908,893,809 | 4,082,987,279 | 8,799,127,380 |

**Lea**

| *Impact Type* | *Employment* | *Labor Income* | *Total Value Added* | *Output* |
|---|---|---|---|---|
| Direct Effect | 30,638 | 2,027,855,784 | 3,624,245,897 | 8,659,000,000 |
| Indirect Effect | 9,586 | 517,845,084 | 721,659,314 | 1,400,588,009 |
| Induced Effect | 9,574 | 328,137,714 | 614,484,518 | 1,056,741,944 |
| Total Effect | 49,798 | 2,873,838,582 | 4,960,389,728 | 11,116,329,953 |

**Otero**

| *Impact Type* | *Employment* | *Labor Income* | *Total Value Added* | *Output* |
|---|---|---|---|---|
| Direct Effect | 13 | 332,483 | 1,329,297 | 3,500,000 |
| Indirect Effect | 6 | 230,813 | 368,785 | 810,997 |
| Induced Effect | 2 | 53,120 | 116,573 | 198,085 |
| Total Effect | 22 | 616,415 | 1,814,655 | 4,509,082 |

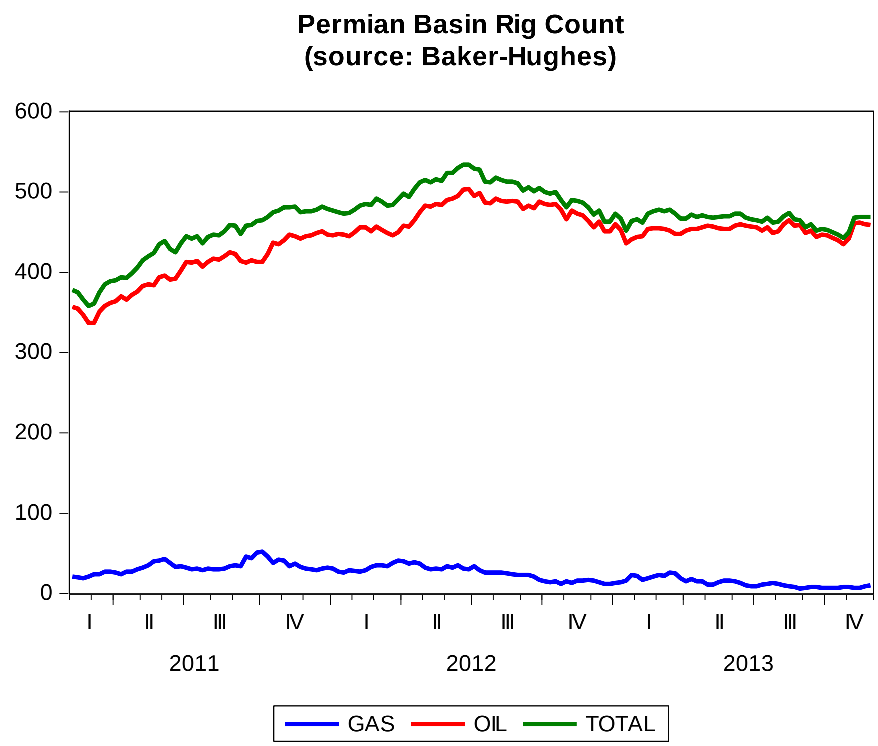
**Roosevelt**

| *Impact Type* | *Employment* | *Labor Income* | *Total Value Added* | *Output* |
|---|---|---|---|---|
| Direct Effect | 321 | 2,838,301 | 18,813,627 | 100,640,000 |
| Indirect Effect | 181 | 5,124,142 | 7,371,993 | 16,691,990 |
| Induced Effect | 29 | 730,681 | 1,742,236 | 3,014,798 |
| Total Effect | 531 | 8,693,124 | 27,927,856 | 120,346,788 |

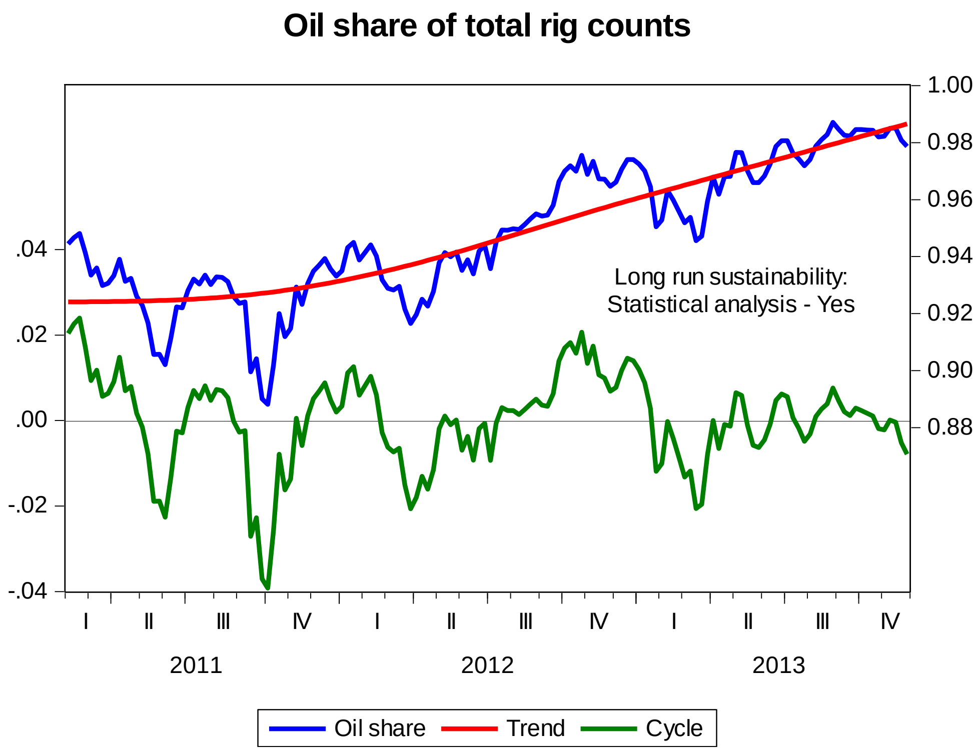
Note: Labor income, total value added and output are measured in current dollars ($).

The preceding discussion and tables highlighted the economic benefits created and sustained by the ongoing operations and continued growth of the Permian Basin's oil and gas industry. While the same methodology is used for the county level analyses as was used for the larger regional analyses, it should be noted that the sum of the county impacts may not sum to the total impacts for the larger Permian region as a whole, nor for the Texas and New Mexico portions of the Permian Basin. This is generally due to the following reasons. First, numbers and values are rounded. Second, leakages occur in all economies in that not all monies spent are entirely contained within the study area. Generally speaking, the larger the study area, the more able the model is to capture the spending and consequently reduce leakages. A third reason is that while data are generally available for each county (e.g., employment) it is quite possible that, for example, an oil and gas worker in one county may work in that country for just a portion of the year and then work in another county (or other counties) for the remainder of the year. Thus, it is possible that this worker may be counted twice, once in each county worked, or possibly not counted at all. In larger models, this type of estimation or measurement "error" tends to wash out, for example, with one county being down a worker and another county being up a worker, with the aggregate result having no average error. Moreover, standard economic impact analysis follows the convention used by the U.S. Bureau of Labor Statistics (BLS) and Bureau of Economic Analysis (BEA) in which jobs are defined as the average annual number of jobs in a sector, industry, county or region over a period of time such as a month or year. For example, a 40 hour per week job lasting for one full year is equivalent to two part-time jobs lasting one full year. Accordingly, for smaller counties in particular, interpretation of impacts should be viewed and interpreted with this caveat in mind.

The Permian Basin's oil and gas industry also generates other economic benefits that are not measured in terms of current jobs, income, value added and output. Historically, the economy has been impacted by the cyclical nature of the industry. However, recent advances and changes in both plays and technology may be altering that scenario. The following chart shows the rig count over 2011-2013. Interestingly, while the rig count has held relatively steady, production has actually been quite high.

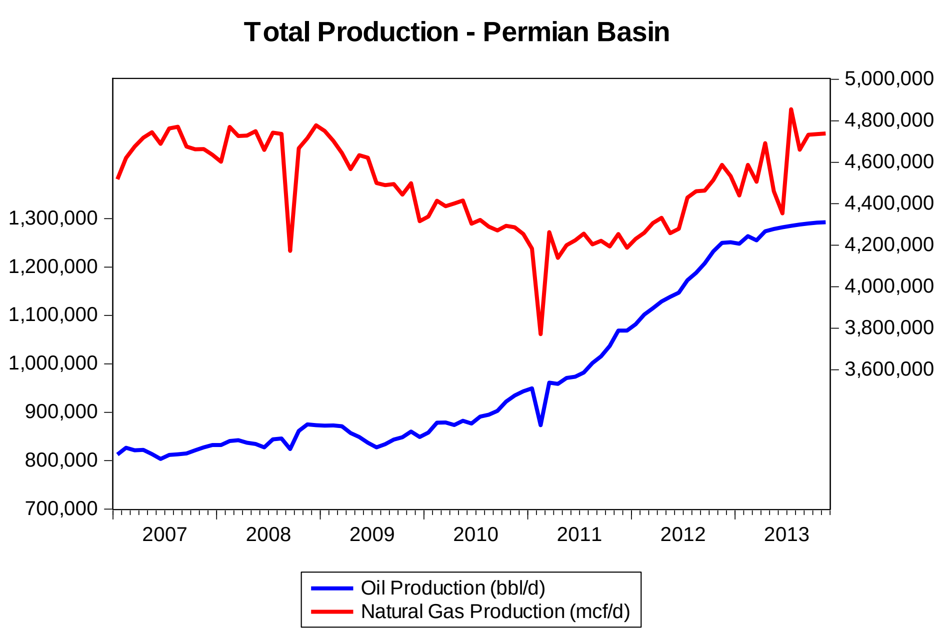



The following chart shows the oil share of total rig counts, which has trended up over this same time period. The nonlinear trend was estimated econometrically and the data were decomposed into both the longer run trend (shown in red) and the shorter run cycle (shown in green) using the well-known Hodrick-Prescott filter. Of interest to economists is whether or not the long run characteristic is sustainable. A series of statistical tests (e.g., unit root tests) were conducted and the results were consistent with this trend being sustainable. Moreover, examination of the cycle reveals another economic benefit, namely, the typical industry cycles are becoming less volatile. Thus, the ability of the oil and gas industry to realize changes in plays and technologies has far-reaching economic benefits to the Permian Basin region. Not only are jobs, income, value added, and output created and generated, but it appears that the economy is becoming more stable and growth more sustainable as a result of the way in which the oil and gas industry now functions.



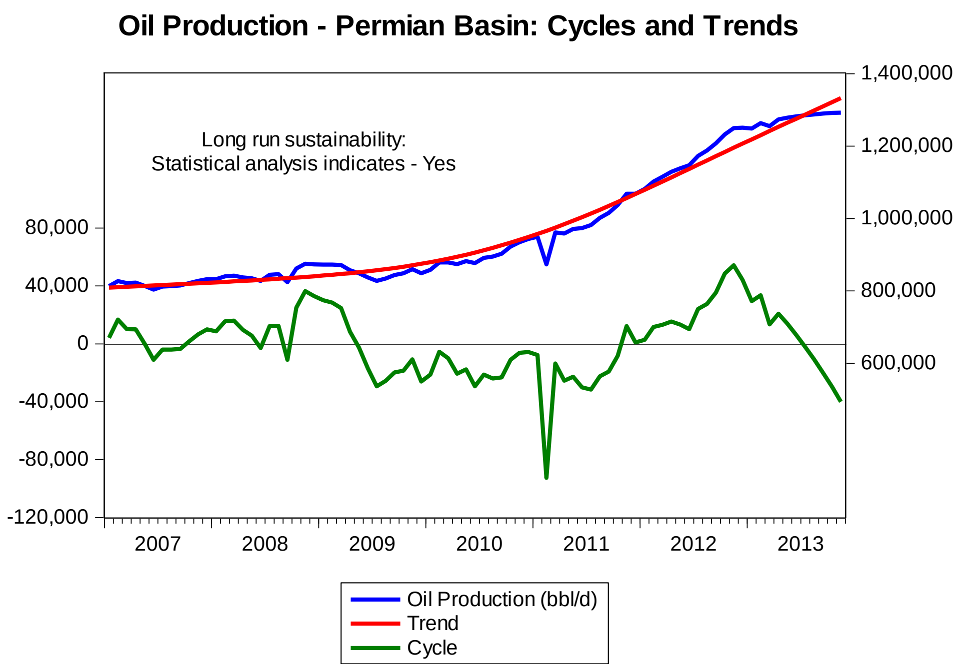

Note: Left axis measures the percent deviation (in decimal) from trend. Right axis measures oil share as a percent (in decimal) of total.

A similar analysis was conducted examining total production. The following chart shows production levels increasing since 2011 following the most recent recession.




Note: Left axis measures oil production. Right axis measures gas production.

Focusing on oil production the time series was decomposed into its trend and cycle. Results imply the economic benefits of sustainable and stable production and are consistent with broader economic benefits associated with this industry.




Note: Left axis measures the actual deviation from trend. Right axis measures oil production.

Further analysis of the trend and cycles in employment levels yielded similar results. That is, recent oil and gas activities generate employment in the Permian Basin that is experiencing some reduction in cycle (i.e., a more stable labor market) but with a slightly less pronounced trend.

**Industry Taxation**

The Oil and Gas Industry is one of the most heavily taxed industries in this country. Although the scope of this section is limited to the upstream portion of the industry from discovery to production to sale of hydrocarbons, there are significant types and amounts of taxation. This section discusses the impacts of taxation of the industry; however, the information provided herein is not intended or offered as legal, accounting or other professional advice, but only as general information affecting the oil and gas industry in those counties included in the Permian Basin. Should the information presented here appear to impact any person, organization of entity, competent professional advice should be obtained. None of the taxes covering transmission, transportation, refining, wholesaling and retailing are included in this study.

Taxes assessed on this portion of the industry include numerous types at the federal, state and local levels. Additionally, while royalties are not a tax, their impact is likely to be substantial on an aggregate basis. According to Kaiser (2010), "Royalty rates are (generally) negotiable on private land but are not publicly disclosed, and will vary with time and location, sometimes dramatically." In fact, according to the New Mexico Oil and Gas Association, total oil and gas revenue to the state was $3.8 billion, the majority of which comes from Southeast New Mexico, of which $1.7 billion goes to the State of New Mexico General Fund. However, these figures represent statewide totals from all sources (royalty, severance taxes and property taxes) paid to all entities and are not broken down by county, and thus not Permian Basin-specific.

According to the Texas Comptroller of Public accounts, the state of Texas received revenue of $1.5 billion from gas production and $2.1 billion from oil production. Previous studies have suggested that on a state-wide basis, royalties to state funds may exceed $1.3 billion (Texas Oil and Gas Association). Note that these figures do not include property taxes. As with New Mexico, these amounts are not reported by county or source.

The impact on state budgets cannot be determined directly, either overall or with respect to the Permian Basin, because there is no mechanism to 1) determine the royalty payments for the states from the counties of the Permian Basin or 2) determine the other oil and gas-related revenues to the state by county without an extensive audit of the Comptroller's records. However, using the foregoing amount of oil and gas revenue ($1.7 billion) to the General Fund and the New Mexico state budget of $5.4 billion (Council of State Governments), revenue received (state-wide) from the oil and gas industry is estimated to amount to 31% of the 2012 budget.

Texas differs from New Mexico in that the state budget is created for a two year period. To determine the impact of the industry on the Texas state budget, several simplifying assumptions must be made and are intended for illustrative purposes only. According to the Texas Comptroller of Public Accounts, the state budget for the 2012-2013 biennium was $173.5 billion. The non-federal portion (which would include oil and gas revenues) of that total amount was $107.055 billion. Allocating one-half of this total to each of the two years gives an amount for 2012 of $53.5275 billion. Thus, the taxes on oil and gas production represent 8.4% of the budget.

The estimation of the amount of taxes collected by the federal government is hindered due to the lack of a publicly available data for determining the federal income taxes assessed to the thousands of companies, partnerships, individuals and royalty owners involved in the upstream sector in the Permian Basin. However, it does seems reasonable to suppose that it is significant compared to other industries and activities. Royalties to Texas and New Mexico universities and Bureau of Land Management constitute other significant benefits from the oil and gas industry; however, a county level determination would require an extensive audit of the General Land Office records. Currently, there is not a mechanism in place for determining the leasehold royalties and production amounts paid to the states and University Lands in Permian Basin counties. However, it is recognized that these facets of the industry do contribute additional benefits and impacts to the economy.

***Texas***

**STATE TAXES** include severance taxes, sales taxes, well servicing taxes and franchise taxes.

SEVERANCE TAX

The standard rates for Texas severance tax are:

Oil: 4.6% of market value of oil produced

Natural Gas: 7.5% of market value of gas produced

Condensate: 4.6% of market value

SALES AND USE TAX

State Sales and Use Taxes are imposed on all retail sales, leases or rentals of most goods and taxable services. Texas cities, counties, transit authorities and special purpose districts have the option of imposing an additional local sales tax for a combined total of state and local taxes of 8 1/4% (.0825)

The ranges of these tax rates are:

- State - 6 1/4% (.0625)
- Cities - 1/4% (.0025) - 2% (.02), depending on local rate.
- Counties - 1/2% (.005) - 1.5% (.015), depending on local rate.
- Transit Districts - 1 /4 % (.0025) - 1% (.01), depending on local rate.
- Special Purpose Districts - 1/8% (.00125) - 2% (.02), depending on local rate.

OIL AND GAS WELL SERVICING TAX

A tax of 2.42% (.0242) of taxable services is imposed on those in the business of providing certain well services and who:

- own, control or furnish the tools, instruments and equipment used in providing well service; or
- use any chemical, electrical or mechanical process in providing service at any oil or gas well during the drilling, completion or reworking or reconditioning of an oil or gas well.

Services that are taxable include:

- Cementing the casing seat
- Perforating the formation
- Fracturing the formation
- Acidizing the formation
- Surveying or testing the formation

In addition to these taxes, the state also receives income from the industry in the form of royalties paid to the Permanent School and the Permanent University Fund as well as environmental and permitting fees.

FRANCHISE TAXES

As with federal income tax collections, there is no public data base available to use in determining the state franchise taxes assessed to and paid by the thousands of companies and royalty owners involved in the upstream sector in the Permian Basin. The basic elements of the franchise tax are:

1. The current franchise tax applies to partnerships (general, limited and limited liability), corporations, LLCs, business trusts, professional associations, business associations, joint ventures, incorporated political committees and other legal entities.

2. The franchise tax does **not** apply to:

a. sole proprietorships (except the tax does apply to single member LLCs filing as a sole proprietor for federal income tax purposes);

b. general partnerships directly and solely owned by natural persons (except the tax does apply to all limited liability partnerships);

c. entities exempt under Subchapter B of Chapter 171 Texas Tax Code;

d. passive entities (as defined under TTC 171.0003). Note that some passive entities have an annual reporting requirement to affirm their passive status. (See FAQ#8 under Passive Entities Rule 3.582); and

e. unincorporated political committees organized under the Election Code or the provisions of the Federal Election Campaign Act of 1971 This provision is effective for reports originally due on or after Jan. 1, 2012.

3. There is a $1,030,000 no tax due threshold, meaning entities to which the franchise tax applies do not owe a tax if their gross income is less than the threshold amount. However, a "NO Tax Due" report must be filed. Likewise, those entities to which the franchise tax **does not** apply may still be required to make periodic filings.

4. The franchise tax rates are:

- 1.0% (.01) for most entities
- 0.5% (.005) for qualifying wholesalers and retailers*
- 0.575% for those entities with $10 million or less in Total Revenue (annualized per 12 month period on which the report is based) electing the E-Z Computation

*Taxable Entities primarily engaged in retail or wholesale trades qualify to use the 0.5% tax rate.

**Retail Trade** means the activities described in Division G and **Wholesale Trade** means the activities described in Division F of the 1987 Standard Industrial Classification Manual published by the federal Office of Management and Budget, respectively.

For more detailed information on tax rates, see the Texas State Comptroller's website (www.window.state.tx.us/), dropdown box "Texas Taxes", "Texas Franchise Tax", "Tax Overview", "Rate Information".

For more detailed information on all aspects of the Texas Franchise Tax, see the Texas State Comptroller's website (www.window.state.tx.us/), dropdown box "Texas Taxes".

**LOCAL TAXES** include those levied by cities, counties, school districts and special districts such as hospital districts and utility districts. The taxable value of producing oil and gas properties is determined each year by the appraisal district in each county. The governing body of each taxing entity approves a tax rate annually. The tax rate of each taxing entity is then applied to the taxable value to obtain the tax due to each taxing entity. In Texas the tax amount equals the tax rate per $100 of taxable value. The tax collector for each taxing entity then mails the tax bills to all owners of producing mineral interests or their agents. Because the rights to receive production are owned by the royalty owner(s) and the working interest owner(s) based on the oil and gas lease that is the basis for the relationship between royalty and working interest owners, each such owner is also liable for the tax associated with the owned interest (recognizing that a royalty owner may have created a nonparticipating royalty interest which is liable for its share of the tax and a working interest owner may have created interests out of its interest such as ORRI, PP, etc. which interests are liable for their share of the tax). Based upon the royalty agreed to in the lease of each producing property, the ownership shares generally range from 1/8 (.125) to ¼ (.25) for royalty owners and 7/8 (.875) to ¾ (.75) for the working interest owners. Thus, when viewing the property tax amounts received by county table below, the "Oil and Gas Tax Levy" column reflects the aggregate paid by all owners of an interest in each producing property in each county, not just the working interest share.

In addition to these direct taxes on the industry, most locations have enacted hotel/motel taxes that, while not industry specific, certainly amount to a significant source of revenue to the local economies due to the significant amount of traveling done by individuals working in the industry.

The following table shows oil and gas tax amounts received by Texas Permian Basin counties for fiscal year 2012.  Taxes received in fiscal year 2012 are those that were assessed on property in 2011.  Tax bills are sent to the property owners in October of the assessed year (2011 in this report) and are payable any time between receipt of the bill and January 31 of the following year (2012) without penalty, interest and collection fees.  These figures represent taxes levied on producing oil and gas properties only and do not include other taxes assessed on pipelines, refineries and other related properties.  The source of this data is provided by the counties to the Texas Comptroller.

## Oil and Gas Property Taxes –FY 2012

| County - Population | Total Tax Base (Mill. $) | Oil & Gas Tax Base (Mill. $) | Oil & Gas Tax Levy (Mill. $) | O&G % of Total Tax Base |
|---|---|---|---|---|
| Andrews – 14,786 | $4,400 | $3,509 | $15.2 | 79.7% |
| Borden – 641 | 645 | 574 | 1.7 | 89.1 |
| Cochran – 3,127 | 784 | 669 | 3.2 | 85.3 |
| Coke – 38,437 | 352 | 155 | 0.8 | 44.0 |
| Crane – 4,375 | 2,245 | 1,963 | 5.8 | 87.5 |
| Crosby – 6,059 | 393 | 116 | 0.6 | 29.6 |
| Culberson – 2,398 | 263 | 36 | 0.3 | 13.8 |
| Dawson – 13,833 | 1,089 | 583 | 3.2 | 53.5 |
| Dickens – 2,444 | 309 | 153 | 0.8 | 49.5 |
| Ector – 137,130 | 10,859 | 4,105 | 14.6 | 37.8 |
| Edwards – 2,002 | 353 | 70 | 0.3 | 19.7 |
| Floyd – 6,446 | 301 | 0[8] | 0[8] | 0.1 |
| Gaines – 17,256 | 5,951 | 4,656 | 16.4 | 78.2 |
| Garza – 6,461 | 845 | 635 | 2.4 | 75.1 |
| Glasscock – 1,226 | 1,403 | 1,134 | 3.4 | 80.9 |
| Hale – 36,273 | 1,974 | 260 | 1.3 | 13.2 |
| Hockley – 22,935 | 3,624 | 2,427 | 8.7 | 67.0 |
| Howard – 35,012 | 2,561 | 1,226 | 5.4 | 47.8 |
| Irion – 1,599 | 733 | 541 | 2.2 | 73.8 |
| Jeff Davis – 2,342 | 227 | 0 | 0 | 0 |
| Kent – 808 | 711 | 639 | 3.6 | 90.0 |
| Kimble – 4,607 | 395 | 0 | 0 | 0 |
| Lamb – 13,977 | 847 | 83 | 0.7 | 9.8 |
| Loving – 82 | 700 | 614 | 3.4 | 87.8 |
| Lubbock – 278,831 | 15,490 | 316 | 1.0 | 2.0 |
| Lynn – 5,915 | 318 | 33 | 0.3 | 10.4 |
| Martin – 4,799 | 2,913 | 2,572 | 6.3 | 88.3 |
| Midland – 136,872 | 13,213 | 3,214 | 6.4 | 24.5 |
| Mitchell – 9,403 | 1,135 | 688 | 2.8 | 60.6 |
| Motley – 1,210 | 88 | 4 | 0[8] | 4.1 |
| Nolan – 15,216 | 1,603 | 190 | 0.8 | 11.9 |
| Pecos – 15,507 | 3,602 | 2,456 | 16.9 | 68.2 |
| Reagan – 3,367 | 2,048 | 1,718 | 5.9 | 83.9 |
| Reeves – 13,783 | 841 | 418 | 1.4 | 49.7 |
| Scurry – 16,921 | 2,684 | 1,460 | 5.8 | 54.5 |
| Sterling – 1,143 | 731 | 307 | 1.2 | 41.9 |
| Terry – 12,651 | 1,200 | 742 | 4.1 | 61.9 |
| Tom Green – 110,224 | 4,594 | 79 | 0.4 | 1.7 |
| Upton – 3,355 | 3,872 | 3,551 | 8.3 | 91.7 |
| Val Verde – 48,879 | 1,905 | 91 | 0.4 | 4.8 |
| Ward – 10,658 | 1,846 | 1,327 | 10.1 | 71.9 |
| Winkler – 7,110 | 1,430 | 984 | 7.2 | 68.8 |
| Yoakum – 7,879 | 4,102 | 3,517 | 13.5 | 85.7 |
| *TOTAL* | *$105,579* | *$47,815* | *$192.80* | |

Notes: Total tax base is the appraised value of all taxable property in each county. Oil and gas tax base is the appraised value of producing oil and gas properties. Oil and gas tax levy is the amount levied on producing oil and gas properties, and county populations are derived from the 2010 census.

The oil and gas tax amounts include state taxes; however, the state receives no property taxes. Those taxes all are paid to the various taxing entities enumerated above (see LOCAL TAXES) and in the amounts listed in the preceding chart for each Texas Permian Basin county under the heading "Oil & Gas Tax Levy (Mill. $)". The corresponding total for each county is divided between all the taxing entities in the county within the boundaries of which the production is located. For example, in Lubbock County for the year 2014, the tax rates are (as a percentage of $100's of valuation): Lubbock County - .34534; Lubbock ISD – 1.235; City of Lubbock - .5044; Lubbock Hospital District - .11844 and Lubbock Water District - .008. Additionally, in the preceding chart, "Oil and Gas Tax Base" (third column) is the combined value of all types of hydrocarbon production even though there are different rates for oil and condensate (4.6% each) and gas (7.5%). Finally, the total for "Oil & Gas Tax Levy (Mill. $)" of $192.8 million only includes property (ad valorem) taxes in the PB counties.

***New Mexico***

The following table shows the tax distributions from oil and gas production in the five New Mexico Permian Basin Counties in 2012. The values in this table are compiled from the NM State Land Office, "Financial Monthly Reports" (http://www.nmstatelands.org) and from ONGARD Tax Type by County Distribution Period Report run January 4, 2013. Data is for FY12. Table reproduced, in part, from "Economic Impact of New Mexico's Oil and Gas Industry - 2012" (Downes, 2012). County populations derived from the 2010 census.

New Mexico Tax Distributions

| County - Population | Ad Valorem Production | Ad Valorem Equipment | Total Ad Valorem Taxes Distributed to Counties (Ad Valorem Prod. & Equip.) | Land Grant and Maintenance Fund Distributions to Beneficiaries | Total County Level Tax Payments from Oil & Gas |
|---|---|---|---|---|---|
| Chaves – 65,645 | $2,256,046 | $444,980 | $2,701,026 | $17,939,124 | $20,640,150 |
| Eddy – 53,829 | $41,634,030 | $5,652,478 | $47,286,508 | $0 | $47,286,508 |
| Lea – 64,727 | $54,308,319 | $8,687,532 | $62,995,851 | $0 | 62,995,851 |
| Otero – 63,797 | $0 | $0 | $0 | $10,608,391 | $10,608,391 |
| Roosevelt – 19,846 | $302,188 | $48,779 | $350,967 | $743,542 | $1,094,509 |
| **TOTAL** | $98,500,583 | $14,833,769 | $113,334,352 | $29,291,057 | $142,625,409 |

A thorough review and analysis that describes all taxes on the industry in New Mexico, their derivation and the distribution of each, is provided in "Economic Impact of New Mexico's Oil and Gas Industry -

2012" (Downes, 2012) and includes a summary of the various sources and distributions of oil and gas taxes in New Mexico.

Consequently, the Texas property taxes of $192,800,000 and the New Mexico Ad Valorem and Land Grant Maintenance Fund distributions of $142,625,409 equal $335,425,409 in tax levies for the counties of the Permian Basin in 2012. This value does not include the multiple-millions of dollars in previously discussed taxes and fees to the federal, state and local government agencies and taxing entities annually.

**Summary**

The Permian Basin's oil and gas industry is an important driver of economic activity in the region and beyond. The industry's activities generate and sustain jobs, income, and output. The industry also provides substantially to the gross state products of both Texas and New Mexico. In addition, through various measures of taxation, the industry provides many localized benefits to the citizens of both New Mexico and Texas. Recent innovations and discoveries in both plays and technologies have given rise to increased production of oil and gas and have led to additional economic benefits that will likely impact the region for years to come. These benefits are in the form of sustainable growth and a more stable economy than has been experienced in the past. Specifically, several potential and confirmed Resources Plays have been identified in the Permian Basin. Resource Plays (Shale Plays being a subset) are the most active drilling areas in the U.S. and have a number of characteristics that make the economics favorable. First, these Resource Plays cover very large areas (multiple counties). Second, they resemble more of a manufacturing type of process where thousands of wells are drilled and enable producers to take advantage of economies of scale. Moreover, wells exhibit a repeatable statistical distribution, thus offer a predictable performance in a given geological subset adding to favorable economics. On the technology side, the Permian Basin has the greatest rig count of any basin/region in the world (27% of the U.S. and 56% of Texas). A rapidly increasing amount of the U.S. and Permian Basin wells are being drilled horizontally. As such, Permian Basin well productivity has improved dramatically since 2011 due to improved technology in horizontal drilling and hydraulic fracturing. Drilling efficiencies are being realized in all U.S. Resource Plays and the Permian Basin is the least mature, thus vast efficiency improvements are expected in the Permian Basin. Unquestionably, the Permian Basin's oil and gas industry is leading the way to new economic heights in Southeast New Mexico and West Texas.

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**Appendix A:** Counties included in the Permian Basin IMPLAN models

Texas Counties (43):
Andrews
Borden
Cochran
Coke
Crane
Crosby
Culberson
Dawson
Dickens
Ector
Edwards
Floyd
Gaines
Garza
Glasscock
Hale
Hockley
Howard
Irion
Jeff Davis
Kent
Kimble
Lamb
Loving
Lubbock
Lynn
Martin
Midland
Mitchell
Motley
Nolan
Pecos
Reagan
Reeves
Scurry
Sterling
Terry
Tom Green
Upton
Val Verde
Ward
Winkler
Yoakum

New Mexico counties (5):
Chaves
Eddy
Lea
Otero
Roosevelt

**Appendix B:** Society of Petroleum Evaluation Engineers (SPEE) parameters for evaluating Resource Plays

The following "Tier 1" characteristics are nearly always observed in Resource Plays:

1. Wells exhibit a repeatable statistical distribution of estimated ultimate recoveries (EURs).
2. Offset well performance is not a reliable predictor of undeveloped location performance.
3. A continuous hydrocarbon system exists that is regional in extent.
4. Free hydrocarbons (non-sorbed) are not held in place by hydrodynamics.

If the reservoir being evaluated satisfies these four criteria, there is a very good chance the reservoir is a Resource Play. Conversely, if any one of these characteristics is absent, it is quite likely the reservoir is NOT a Resource Play. The Tier 1 criteria are listed in order of significance and both geological and engineering data must support these criteria.

The Tier 1 criteria possess aspects of engineering and geology, and determining whether a reservoir is a Resource Play requires consideration of both. The geological depositional model needs to describe a reservoir with regional extent, while the engineering data needs to show statistically repeatable EURs over time. Obviously, sufficient time is required to arrive at these conclusions - time for historical data to accumulate, and time to analyze the data.

As a practical matter, it is anticipated that Resource Plays will encompass more than 100 completed wells in the reservoir. There are two rationales for this: first, developing a usable statistical model in a Resource Play typically requires about 100 wells; and second, a reservoir that has sufficient areal extent to be considered a Resource Play will likely encompass a minimum of 100 wells.

Although the following "Tier 2" reservoir characteristics are not required, these are commonly observed in Resource Plays:

5. Requires extensive stimulation to produce at economic rates.
6. Produces little in-situ water (except for Coalbed Methane and Tight Oil Reservoirs).
7. Does not exhibit an obvious seal or trap.
8. Low permeability (< 0.1 md).

**Appendix C**: Detailed Play and Reservoir Description by county within the Permian Basin

Within District 8A, Gaines, Garza, and Yoakum counties have substantial conventional drilling activity. Target reservoirs are the San Andres, Clear Folk, Canyon, and Strawn. Based on drilling permits discussed in this report, drilling has been relatively consistent in these conventional reservoirs and has recently increased slightly due to oil prices. These conventional reservoirs have historically been the main objective for secondary and tertiary oil recovery projects. Crosby County activity is attributed to conventional drilling in the Clear Fork reservoir. More horizontal wells are being drilled in the lower permeability San Andres reservoirs, primarily in the Yoakum County which previously resulted in marginal economic vertical wells. Basically, what is going on is operators are employing the same technology used in the unconventional shale plays in lower perm conventional plays.

In south east New Mexico, the Bone Springs and Glorieta -Yeso dominated most of the activity as seen in Figures C.7 and C.8. Horizontal well activity has recently increased substantially and primarily occurred in the Bone Springs, Abo, Wolfcamp and Yeso Plays in Eddy County. Other significant development occurred in the traditional Grayburg/San Andres, Delaware Sand and Yeso/Leonard Plays of Lea and Eddy counties. Advances in stimulation technology have resulted in significant infill drilling potential in the Yeso Play. Delaware Play has seen continued activity in development drilling with likely additional Waterflood potential. The San Andres trends consist of continued pattern realignments and replacement wells in the large, prolific units such as Vacuum, Hobbs, Maljamar, and Eunice-Monument. CO2-enhanced oil recovery (EOR) is ongoing in several of these units, with remaining pools the top candidates for expansion into CO2-EOR. The highest potential in the New Mexico portion of the Permian Basin is in the currently active oil plays of the Bone Spring and Leonard-Yeso. These plays are oil prone and have seen an increased horizontal drilling and hydraulic fracturing by operators in the last few years. Other oil prone plays in this region that are very mature, deep or/and with limited reserve are the Ellenburger, Fusselman, NW Shelf, Simpson Sandstone, Woodford and Wristen plays/reservoirs. The Abo Shelf Sand, Akota, Akota-Marrow, Morrow, and Pre-Permian plays are low potential gas prone plays and are being drained by infill drilling. The Artesia-Vacuum GB/SA and Delaware Mountain Group are mature oil/gas prone plays with long term EOR-CO2 potential (Thomas W. Engler et al, 2011).

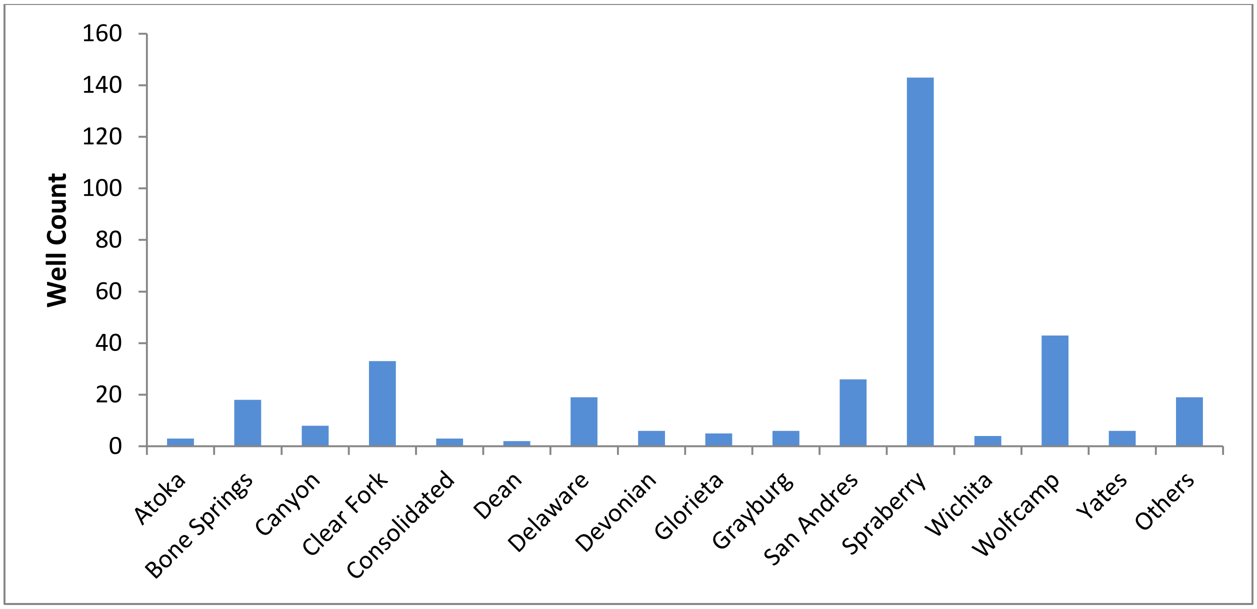


Figure C.1: District 8: Last Twelve Month (Oct. 1, 2012-Sept. 30, 2013) Drilling Activity by Play Type (Source: DrillingInfo)

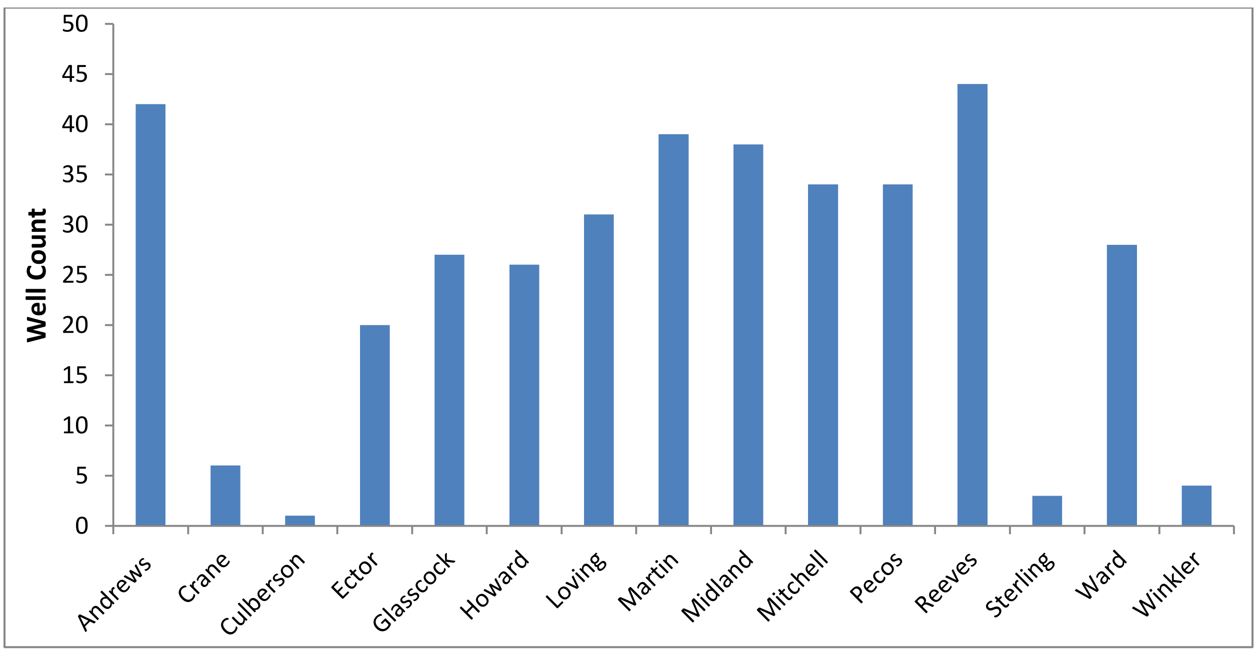


Figure C.2: District 8: Detail County Last Twelve Month (Oct. 1, 2012-Sept. 30, 2013) Drilling Activity (Source: DrillingInfo)

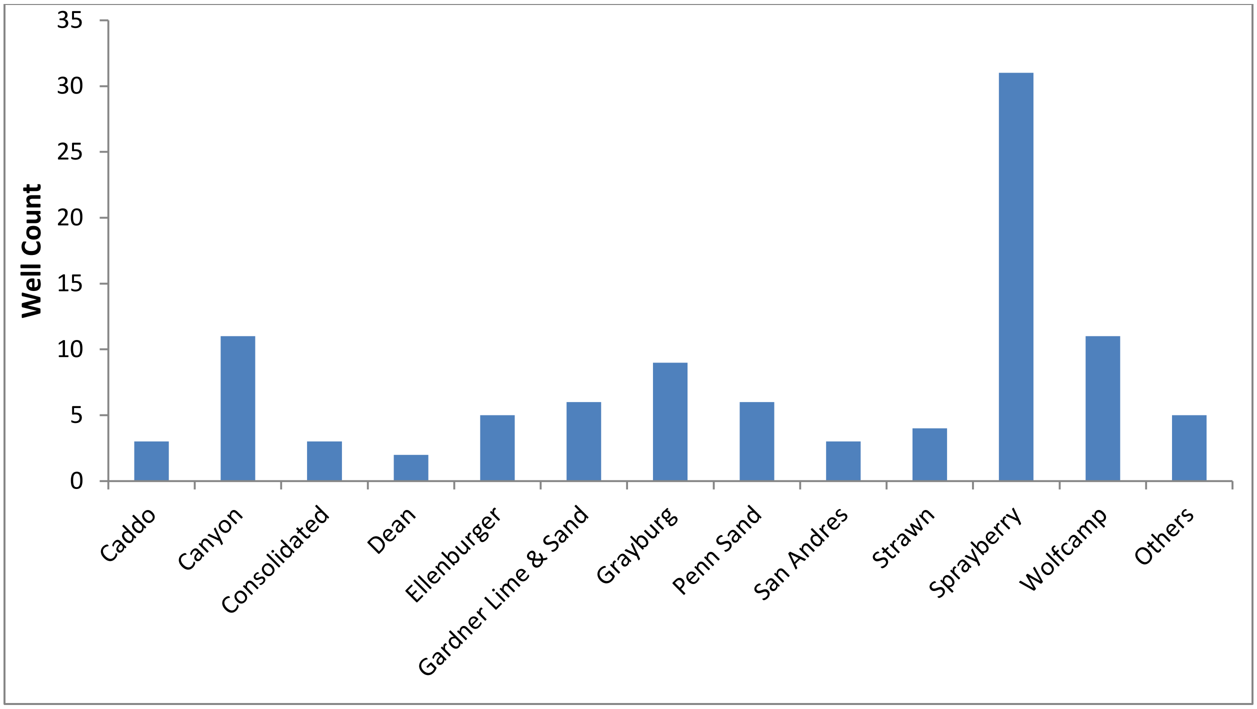


Figure C.3: District 7C (with Nolan and Val Verde): Last Twelve Month (Oct. 1, 2012-Sept. 30, 2013) Drilling Activity by Play Type (Source: DrillingInfo)

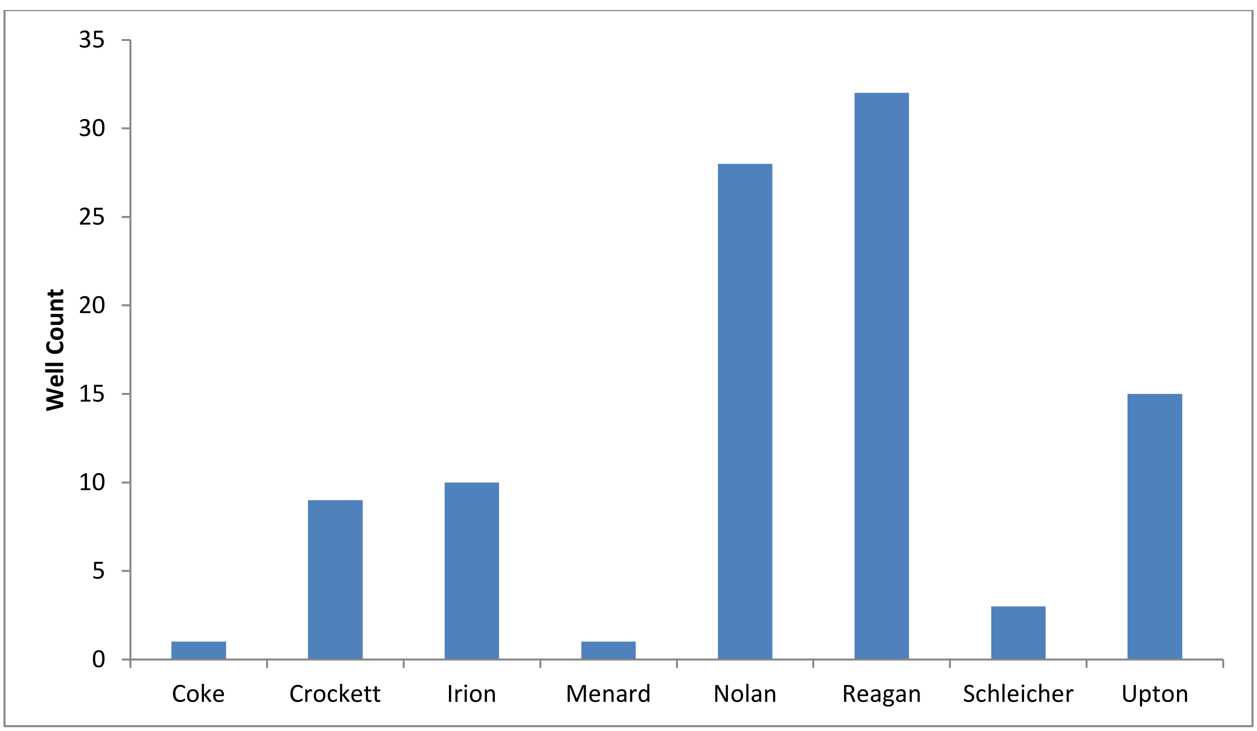


Figure C.4: District 7C (with Nolan and Val Verde): Last Twelve Month (Oct. 1, 2012-Sept. 30, 2013) Drilling Activity by Play Type (Source: DrillingInfo)

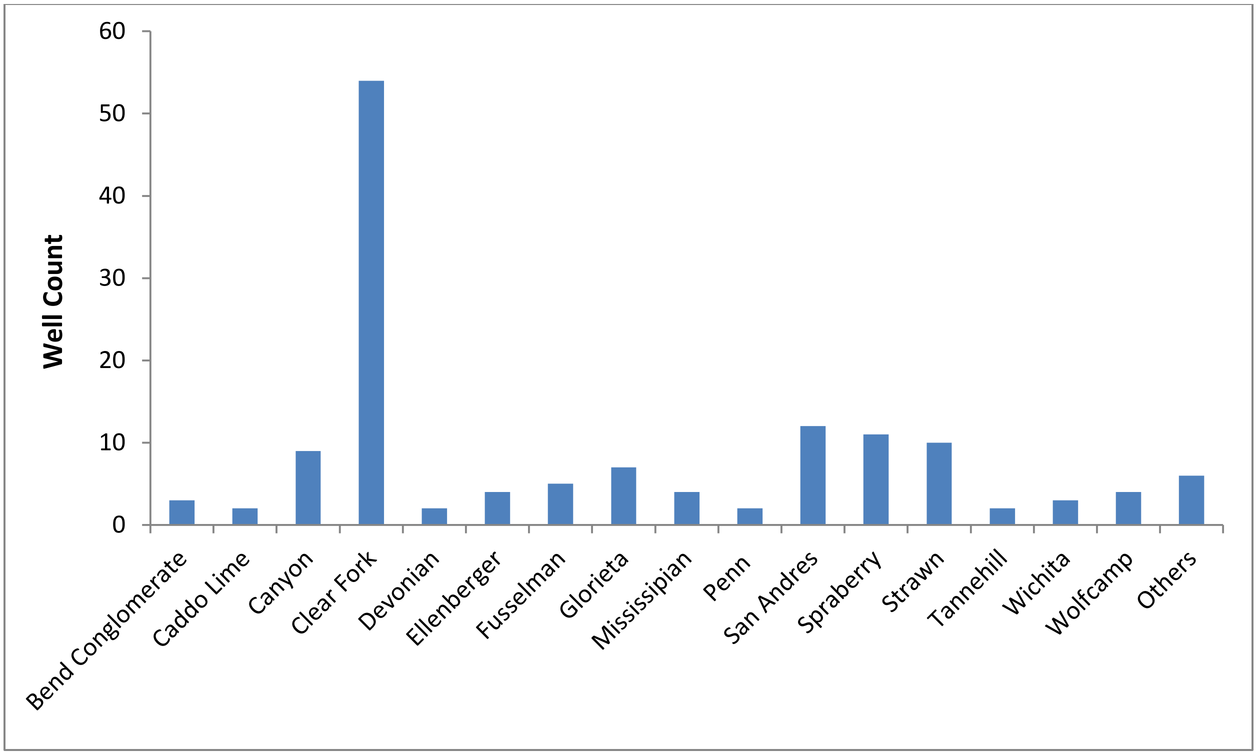


Figure C.5: District 8A (with Fisher and Stonewall): Last Twelve Month (Oct. 1, 2012-Sept. 30, 2013) Drilling Activity by Play Type (Source: DrillingInfo)

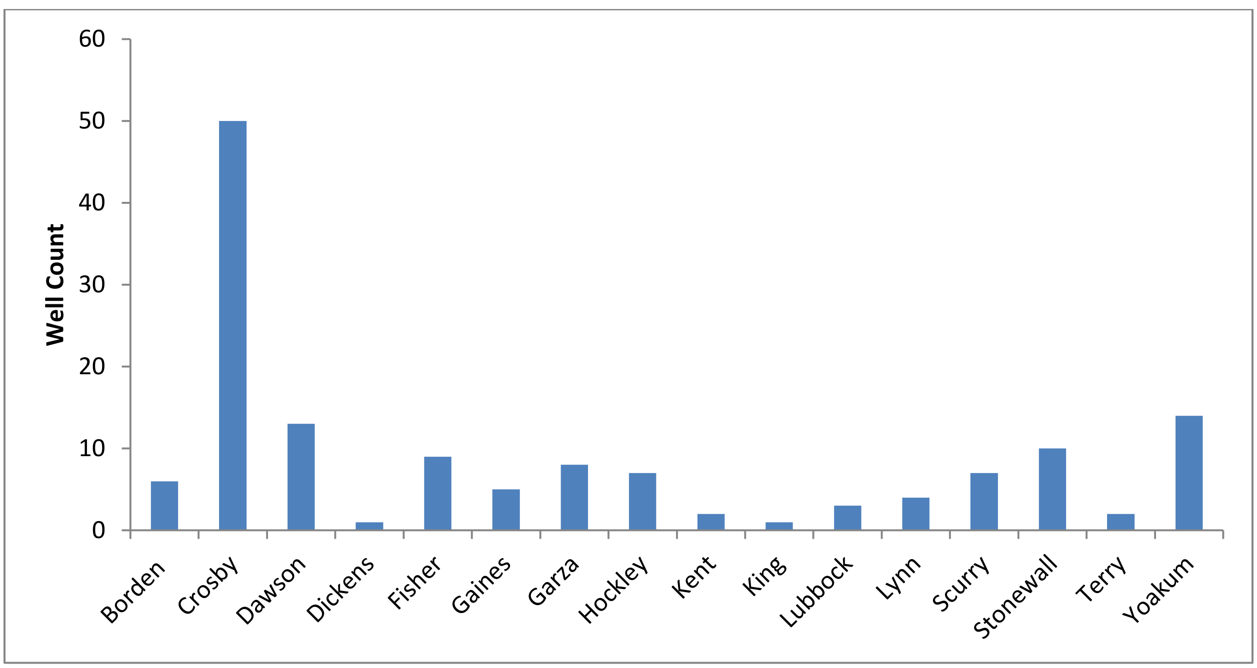


Figure C.6: District 8A (with Fisher and Stonewall): Last Twelve Month (Oct. 1, 2012-Sept. 30, 2013) Drilling Activity by County (Source: DrillingInfo)

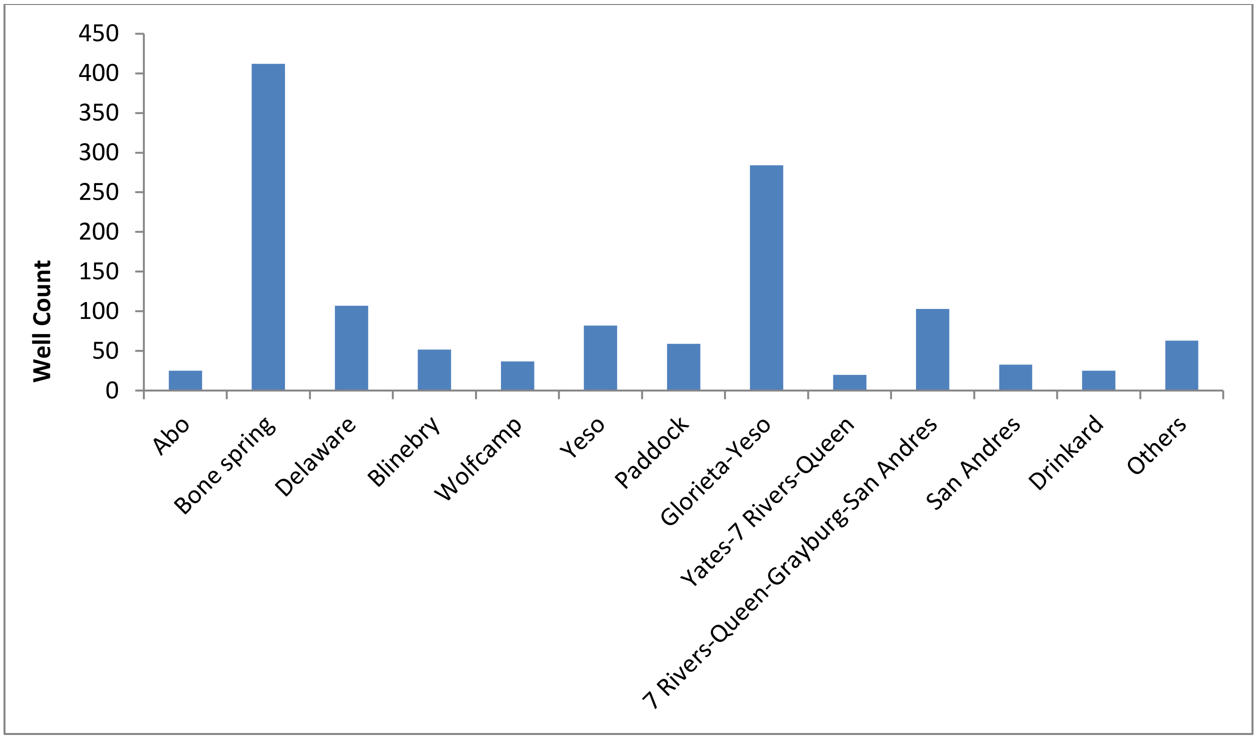


Figure C.7: New Mexico Portion of Permian Basin: Last Twelve Month (Oct. 1, 2012-Sept. 30, 2013) Drilling Activity by Play Type (Source: DrillingInfo)

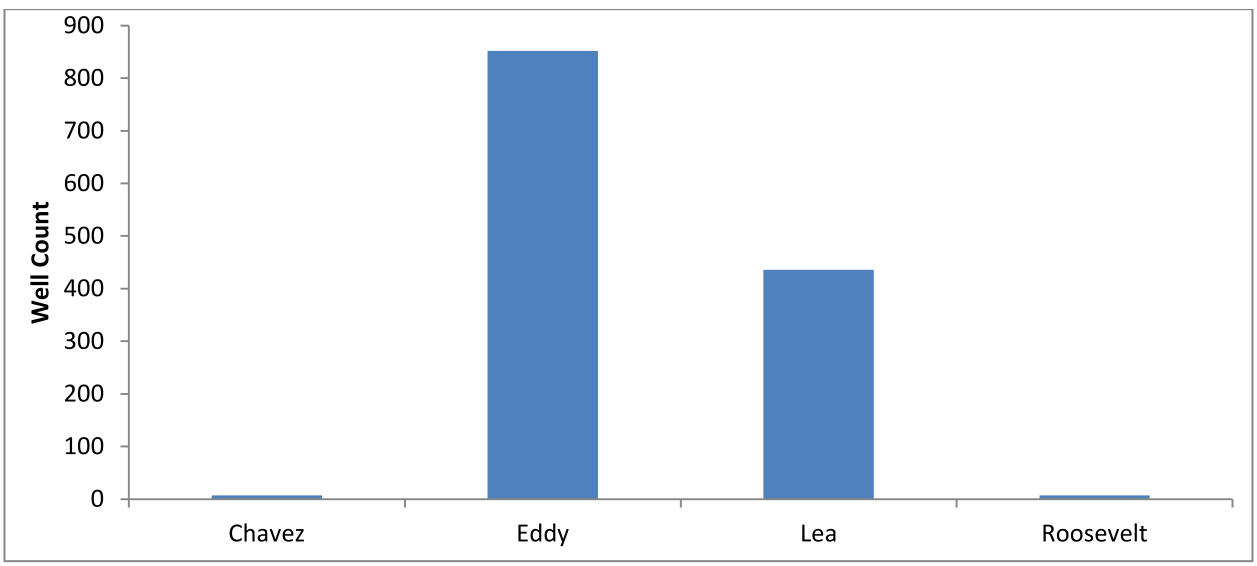


Figure C.8: New Mexico Portion of the Permian Basin: Last Twelve Month (Oct. 1, 2012-Sept. 30, 2013) Drilling Activity by County (Source: DrillingInfo)

**Appendix D**: Rig Count, Changes and Distribution

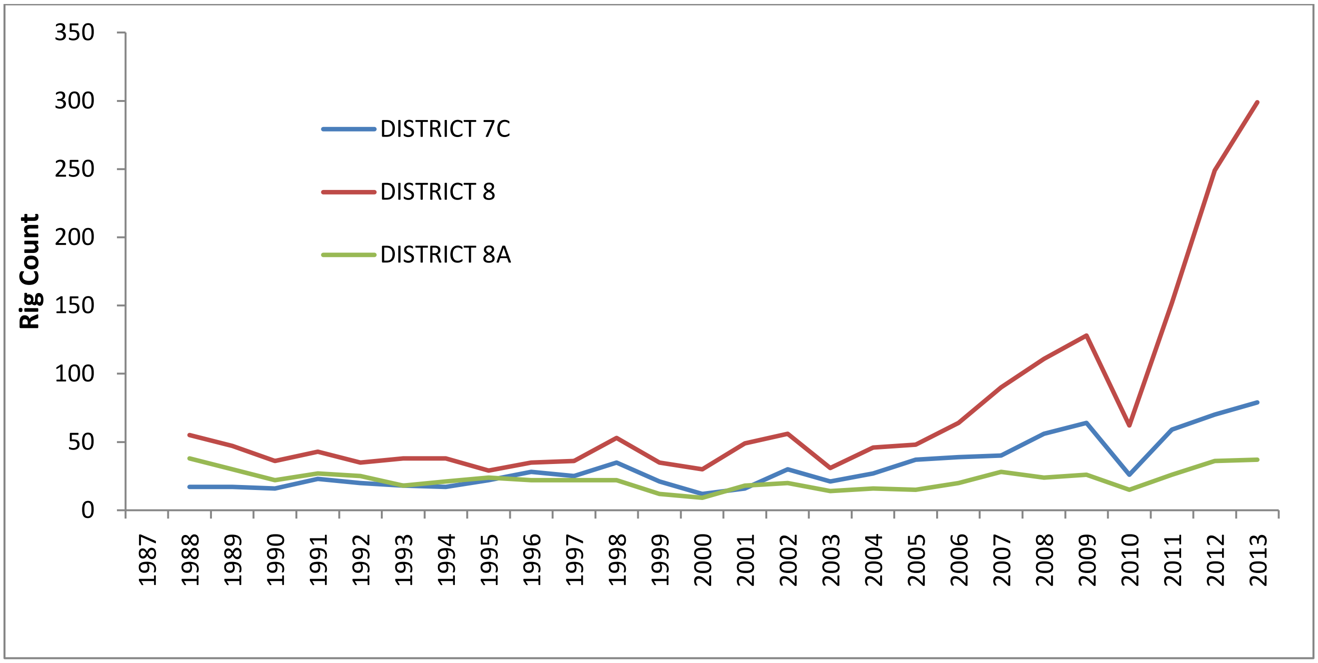


Figure D.1: Detailed Texas Portion of the Permian Basin Historical Annual Average Rig Count through 2013 (Source: Baker Hughes)

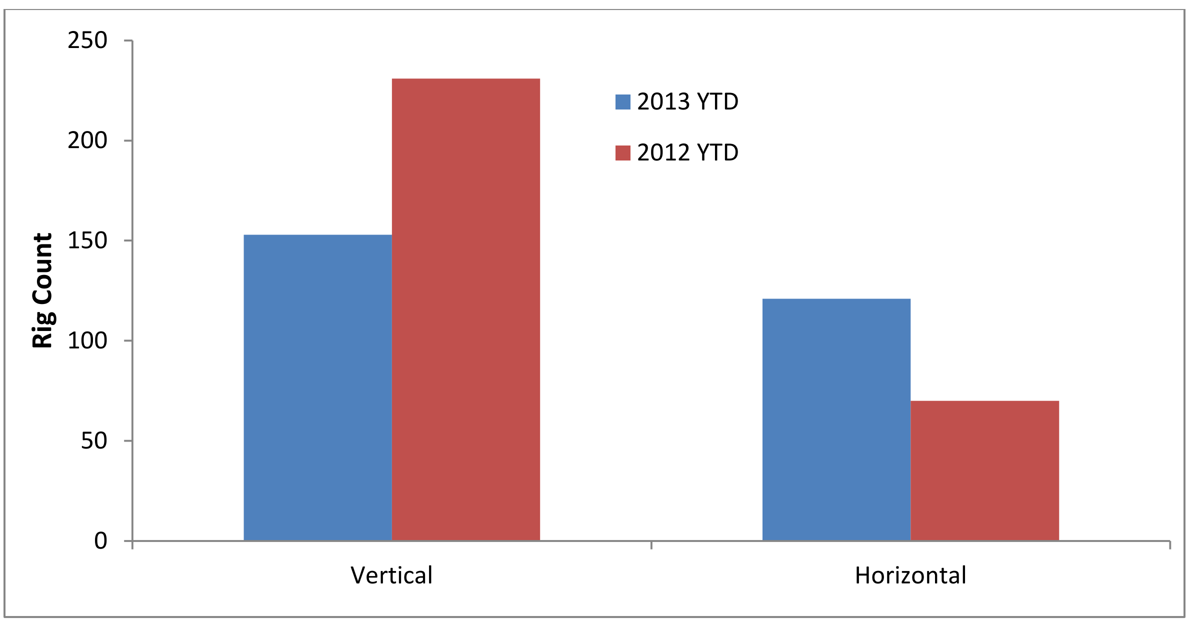


Figure D.2: District 8: Annual Average Rig Count by Drill Type and Change from Last Year (Source: Baker Hughes)

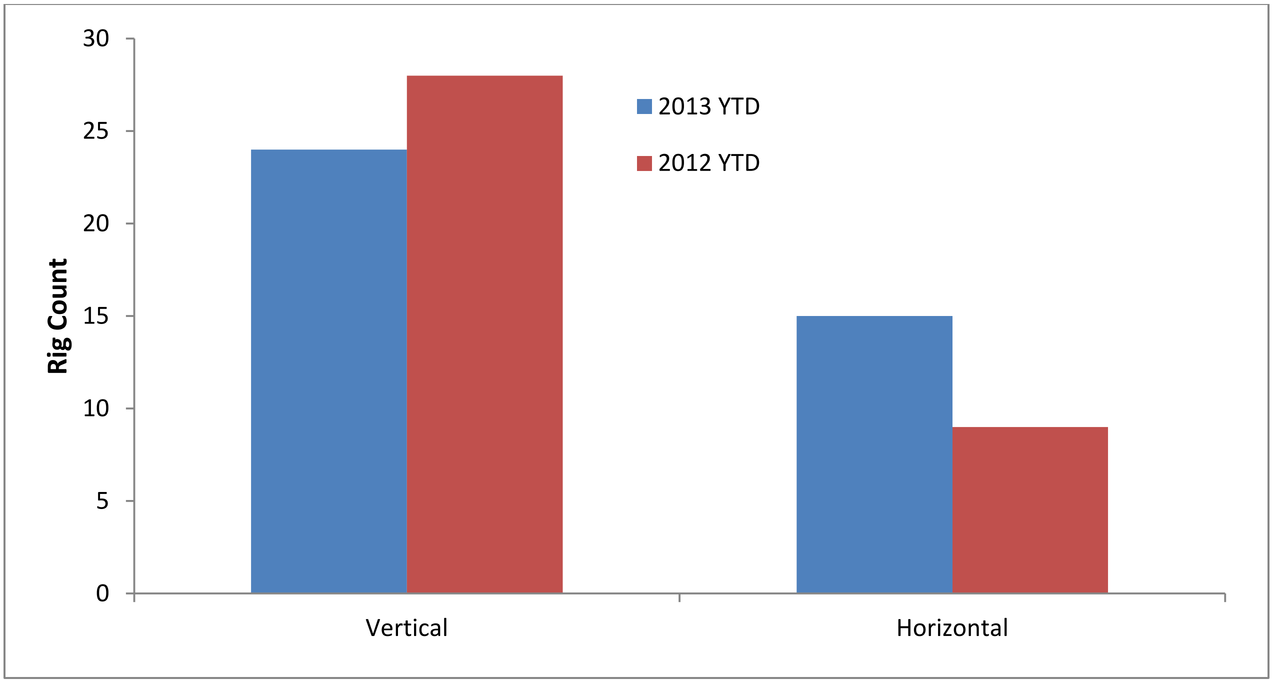


Figure D.3: District 8A (Without Fisher & Stonewall Counties): Rig Count by Drill Type and Change From Last Year (Source: Baker Hughes)

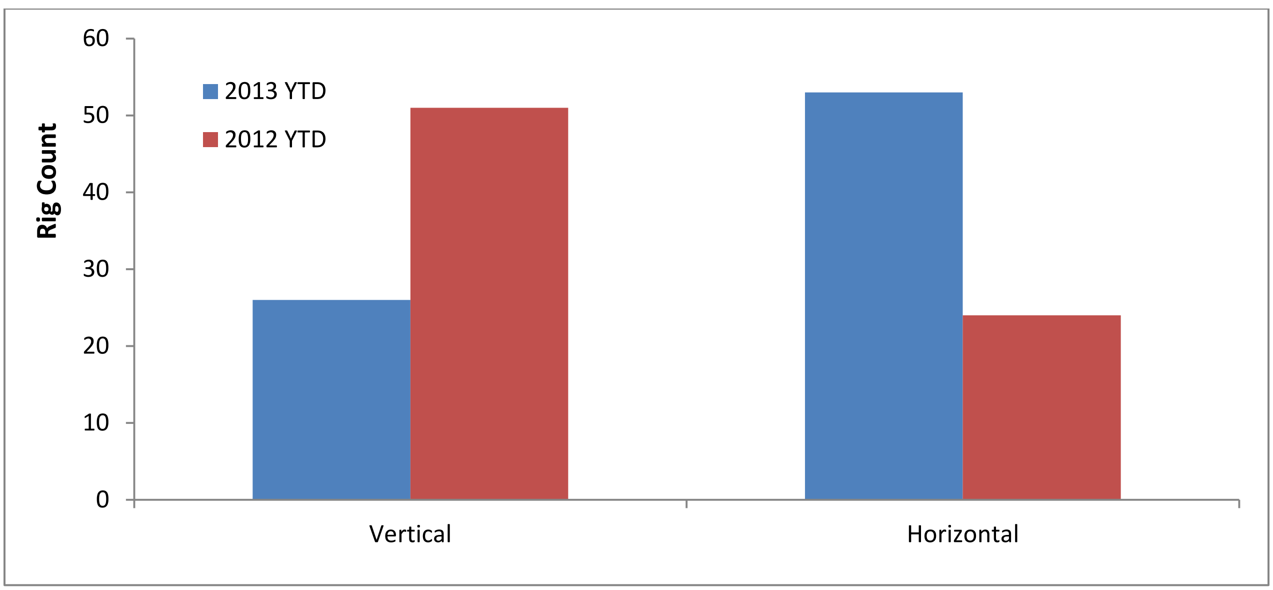


Figure D.4: District 7C: Rig Count by Drill Type (Source: Baker Hughes)

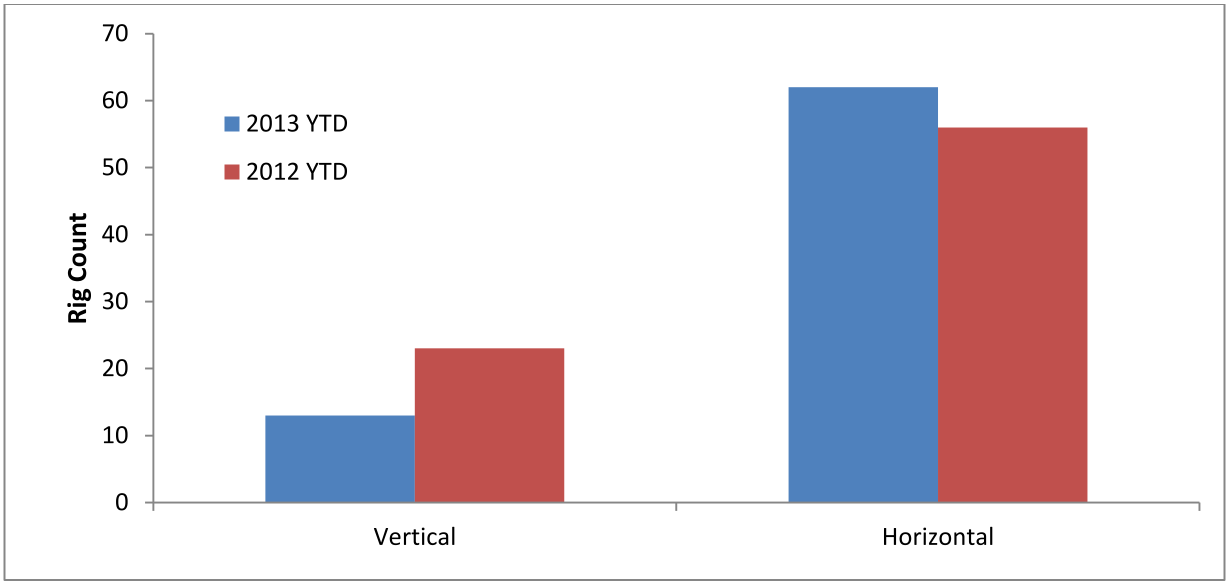


Figure D.5: South East New Mexico (Including Lea, Eddy, Roosevelt, Oterro and Chaves): Rig Count By Drill Type (Source: Baker Hughes)

**Appendix E**: Drilling/Completions Technology, Permits, and Productions Trend

Figures E.1 through E.19 show a steady increase in the number of drilling permits and the resulting increase in oil and gas production for each district in the Permian Basin. There was a drastic decline in annual gas production from over 400 Bcf to approximately 147 Bcf in Texas RRC District 8A in 2005, as seen in Figures E.10 and E.11 and also reflected in the productions data for the entire Permian Basin, shown in Figures E.18 and E.19. This decline is due to flawed production volume reporting by one of the major gas producing operators utilizing and adding $CO_2$ and other air mixed injections volume, thus, a historical check and data updating was requested by the Texas Railroad Commission. All 'Drilling Permit vs. Time' plots show a decline in the number of drilling permits during the 2008 recession. Shortly after the 2008 recession began, oil prices rebounded and, Permian Basin drilling permits quickly were restored back to pre-recession levels. However, as can be seen in Figures E.1, E.5, E.9 and E.13, horizontal drilling activity was a major portion of those recent permits as compared to pre 2008.

Note that 'Vintage' plots shown in Figures E.4, E.8, E.12 and E.16 demonstrate the incremental production added by each year's drilling. Additionally, these 'Vintage' plots show what would happen if drilling were to cease after that year. As shown in Figures E.4 and E.8 District 7c and 8 respectively, the substantially larger wedges from 2007 through 2009 are from the increase in Spraberry/Wolfberry drilling. Afterwards, wedges continually got larger due to the horizontal drilling in the Wolfcamp, Avalon, and Bone Spring plays primarily located in the southwestern portion of both districts. Several key technologies have been identified for further investigation; e.g., horizontal drilling and completion, and quantification of residual oil zones (ROZs). Since these technologies cross-cut through various plays, their impact should be evaluated separately.

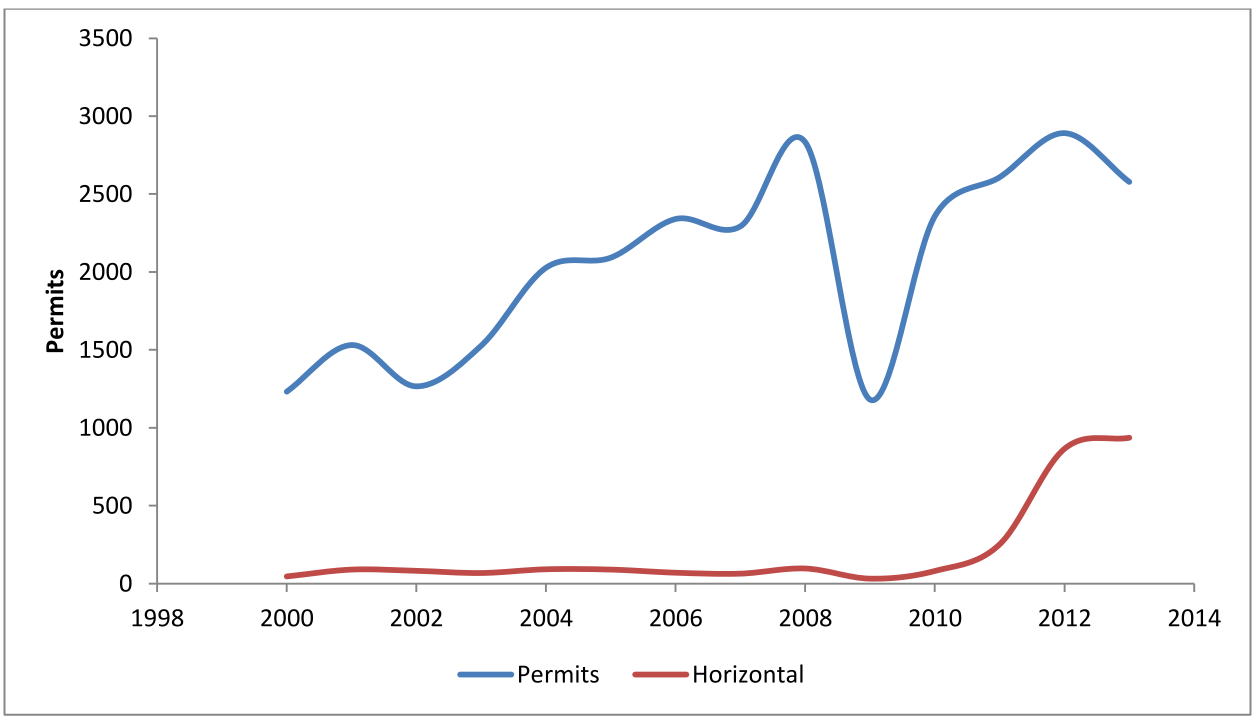


Figure E.1: District 7C (with Nolan and Val Verde): Drilling Permit vs. Time Plot (Source: DrillingInfo)

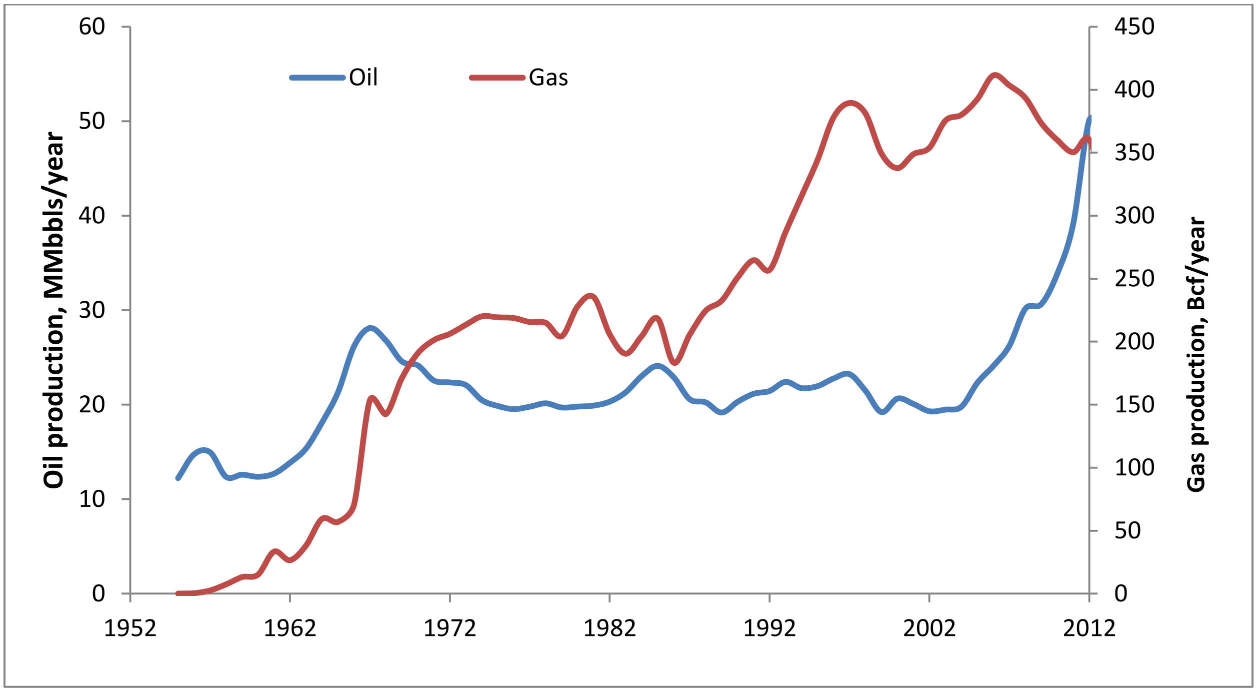


Figure E.2: District 7C (with Nolan and Val Verde): Historical Annual Average Productions (Source: DrillingInfo)

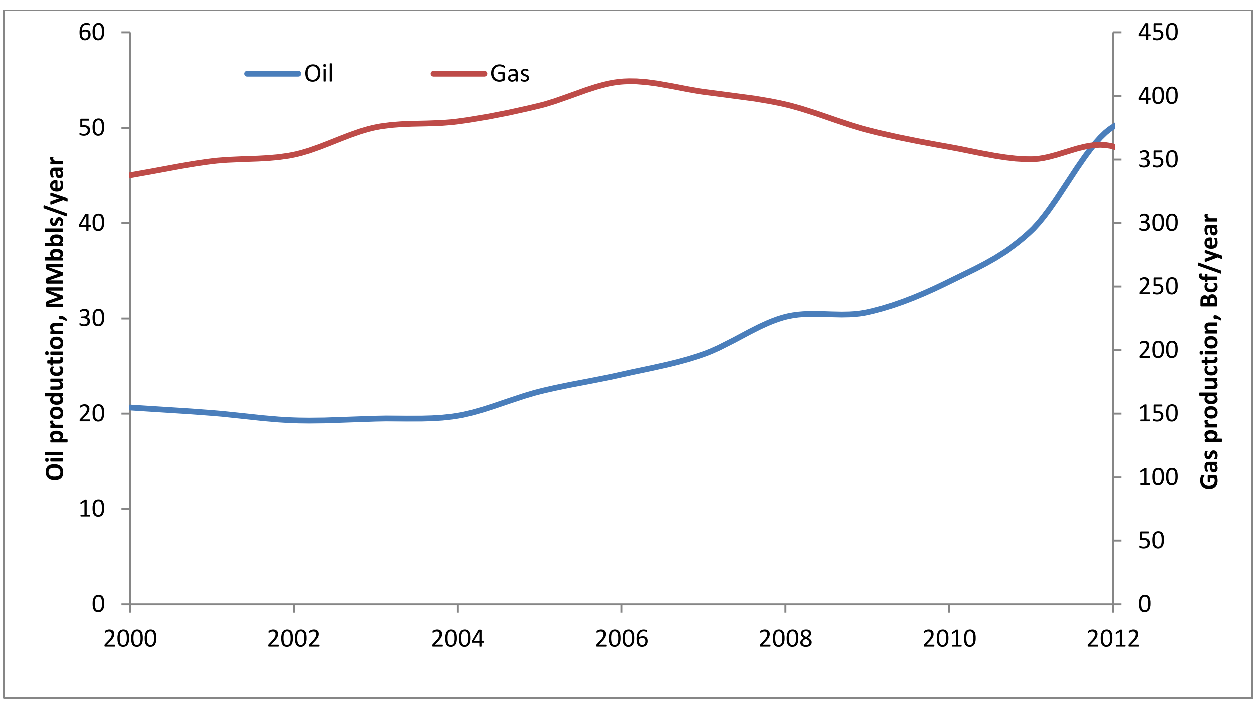


Figure E.3: District 7C (with Nolan and Val Verde): Zoomed View of Last Thirteen Yearly Average Productions (Source: DrillingInfo)

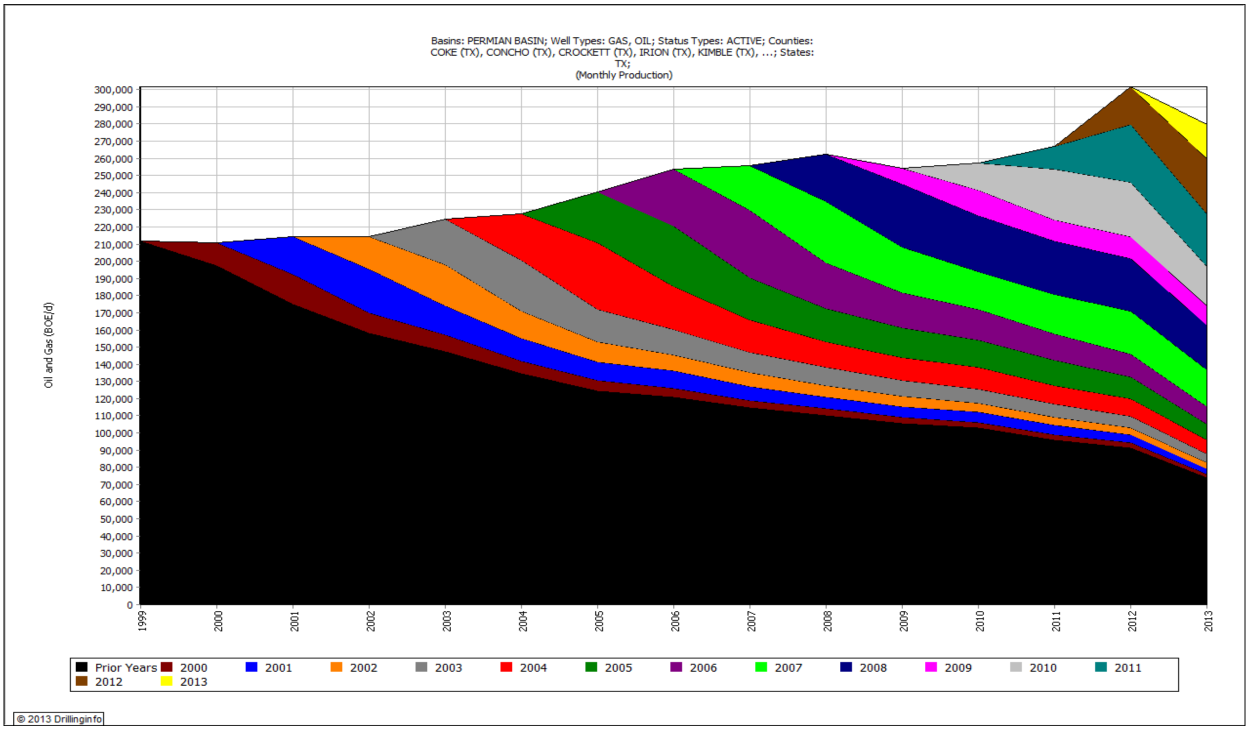


Figure E.4: District 7C (with Nolan and Fisher): A Vintage Plot of Annual Cumulative Production Plot from 2000 (Source: DrillingInfo)

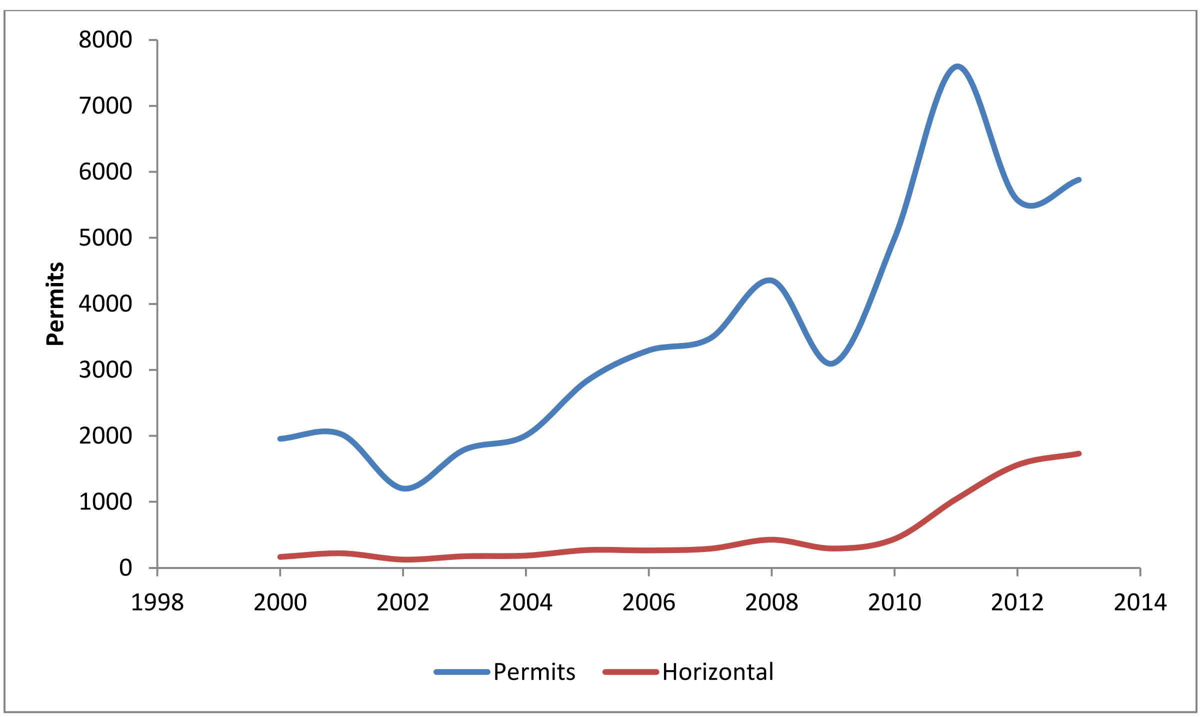


Figure E.5: District 8: Drilling Permit vs. Time Plot (Source: DrillingInfo)

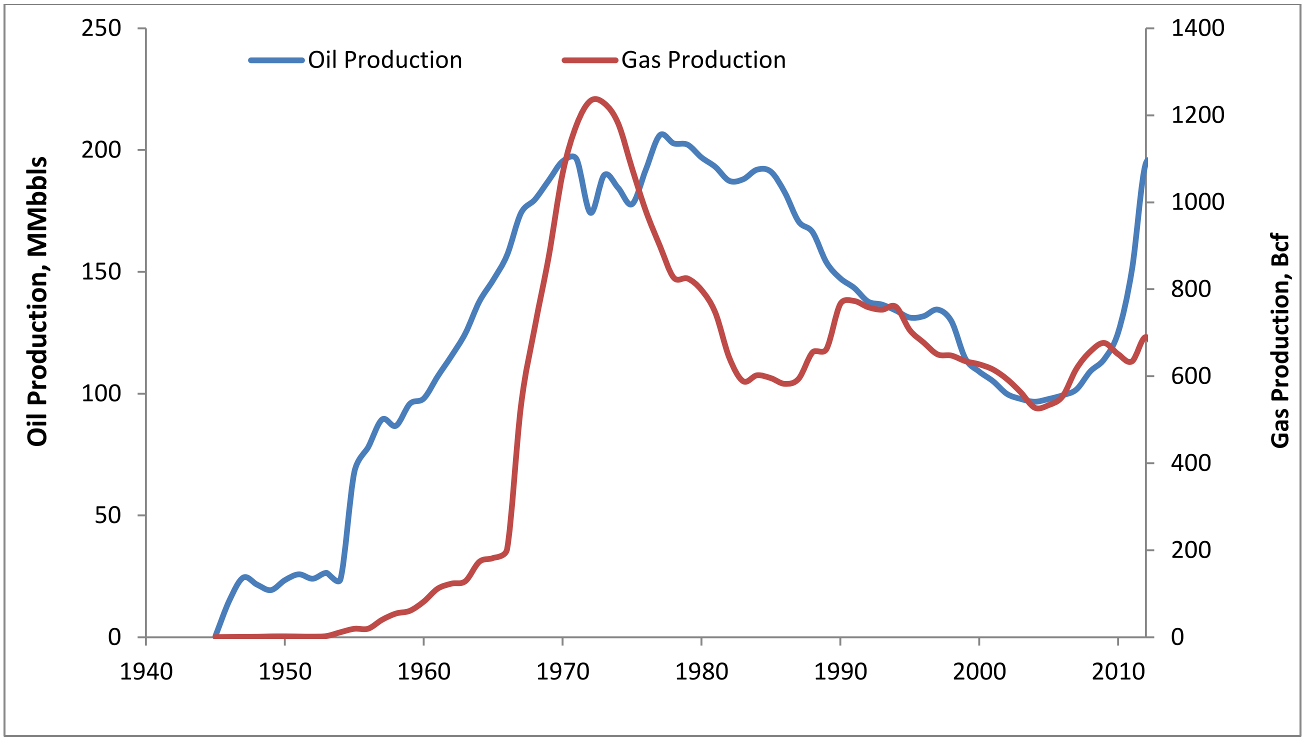


Figure E.6: District 8: Historical Annual Average Productions (Source: DrillingInfo)

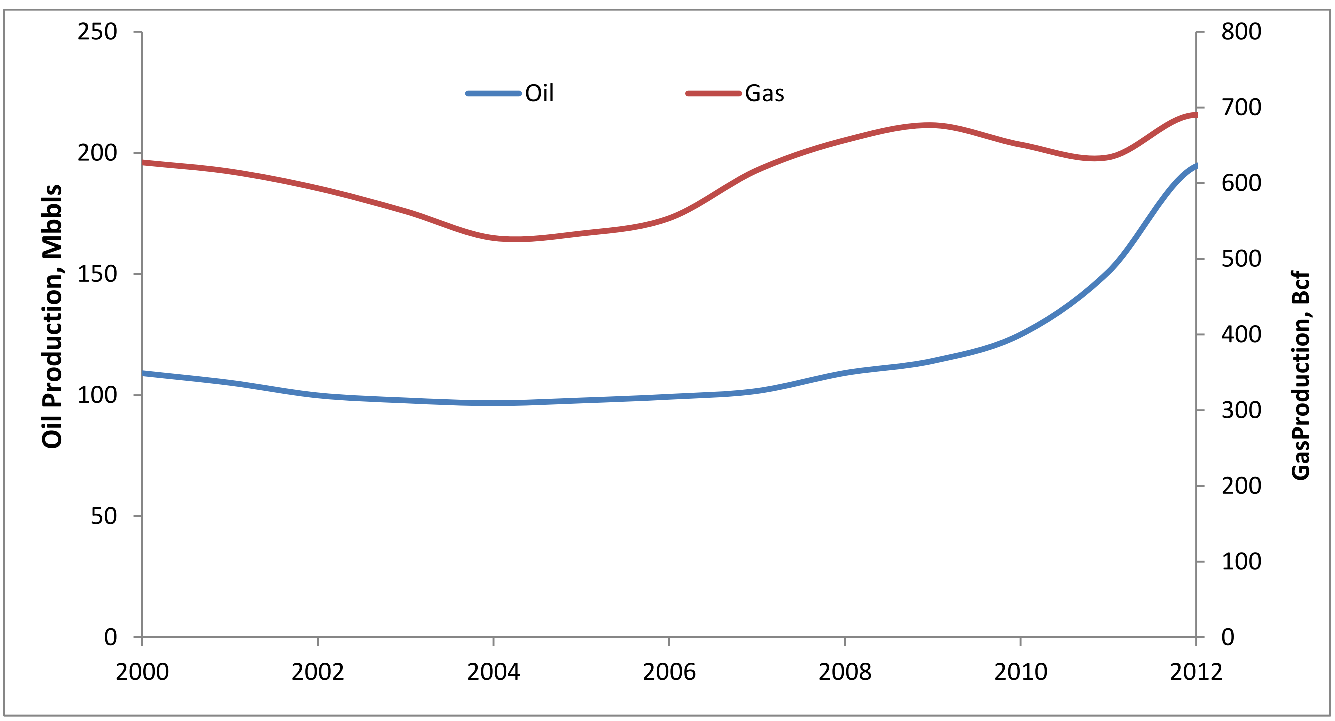


Figure E.7: District 8: Zoomed View of Last Thirteen Annual Average Productions (Source: DrillingInfo)

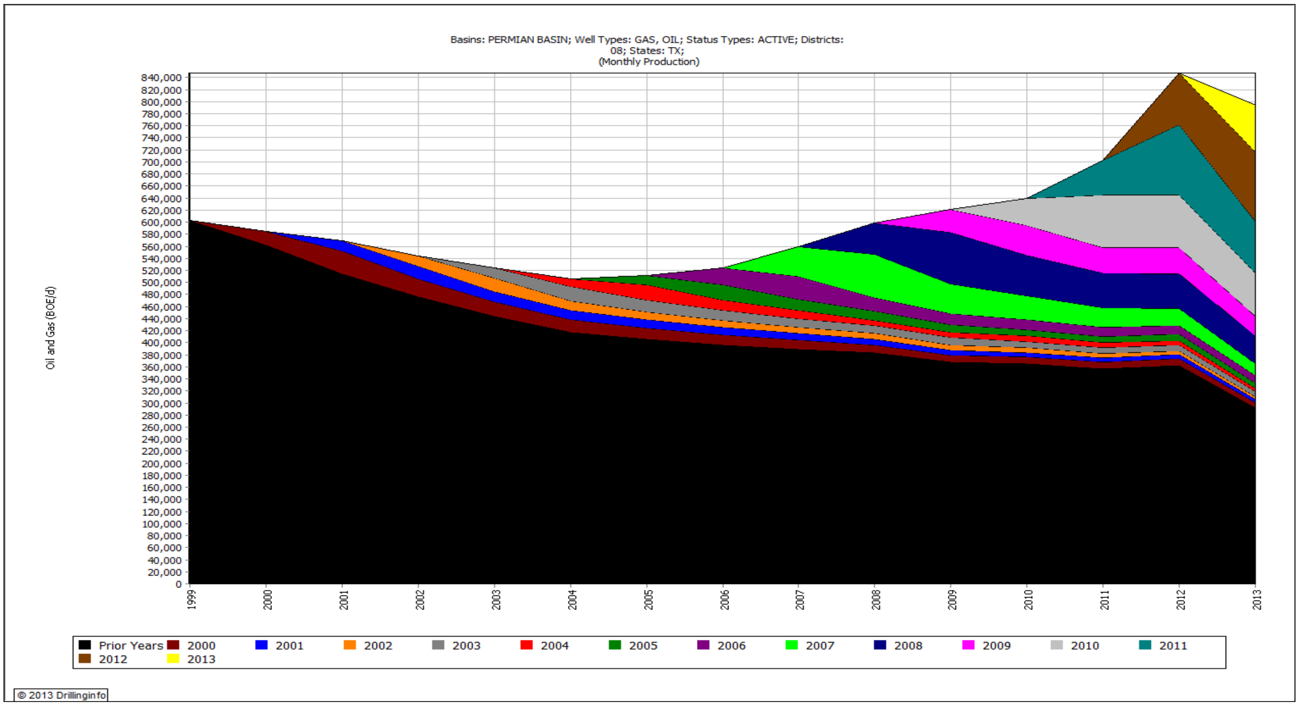


Figure E.8: District 8: A Vintage Plot of Annual Cumulative Productions Plot from 2000 (Source: DrillingInfo)

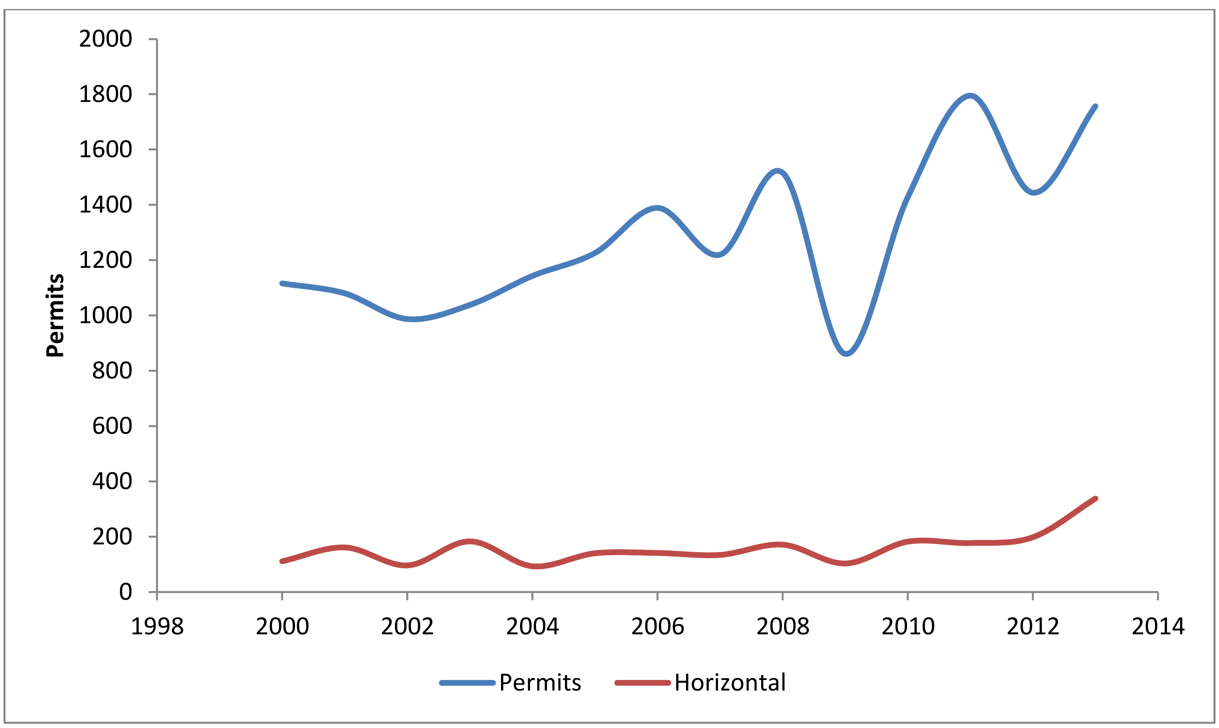


Figure E.9: District 8A (with Fisher and Stonewall): Drilling Permit vs. Time Plot (Source: DrillingInfo)

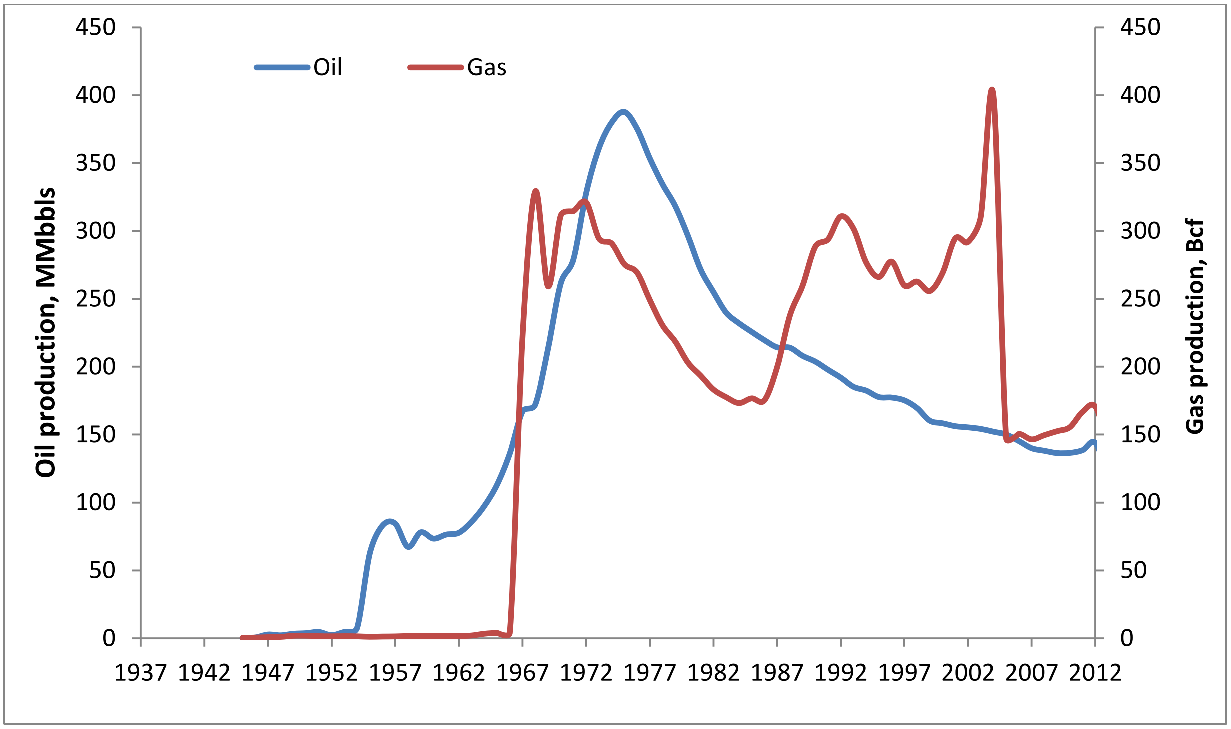


Figure E.10: District 8A (with Fisher and Stonewall): Historical Annual Average Productions (Source: DrillingInfo)

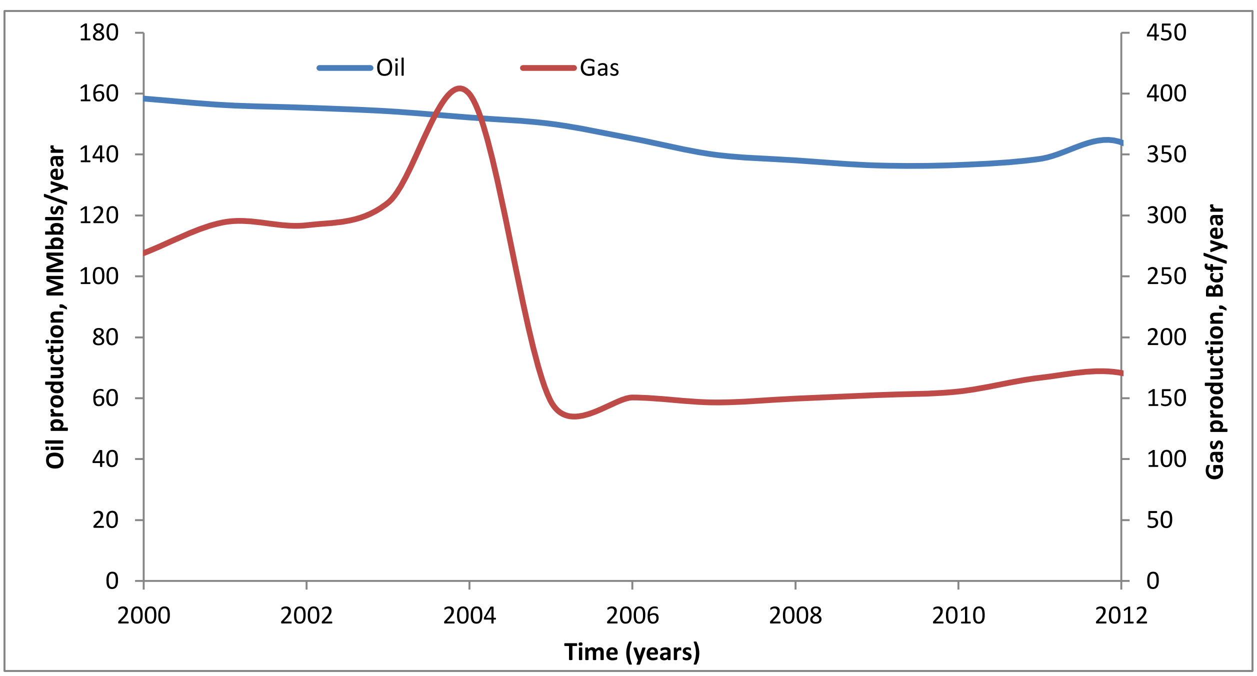


Figure E.11: District 8A (with Fisher and Stonewall): Zoomed View of Last Thirteen Annual Average Productions (Source: DrillingInfo)

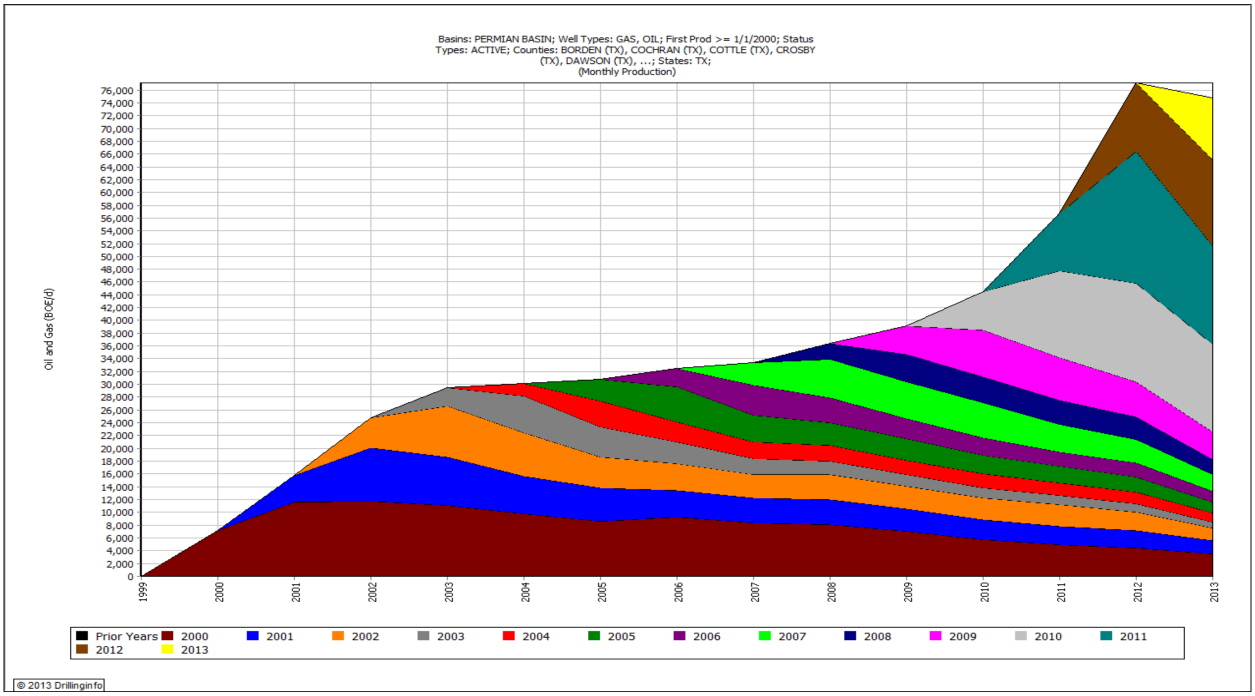


Figure E.12: District 8A (with Fisher and Stonewall): A Vintage Plot of Annual Cumulative Productions from 2000 (Source: DrillingInfo)

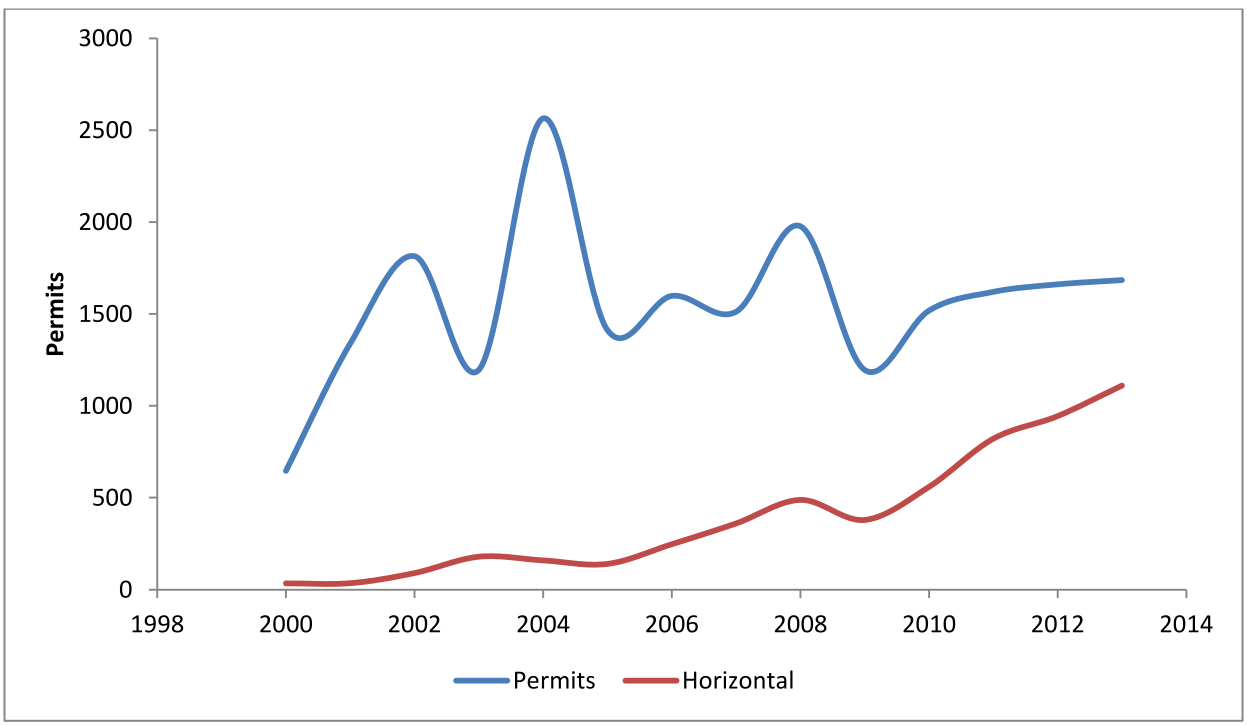


Figure E.13: South East New Mexico Portion of the Permian Basin Drilling Permit vs. Time Plot (Source: DrillingInfo)

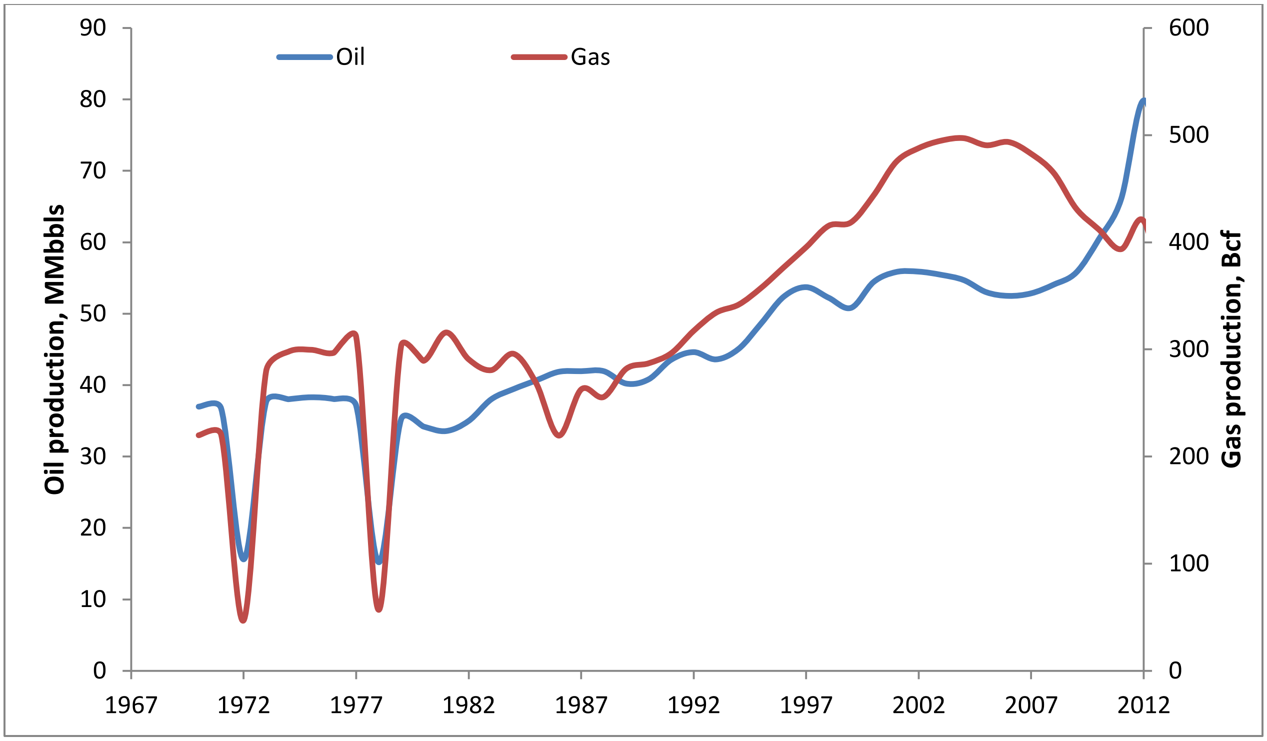


Figure E.14: New Mexico Portion of the Permian Basin: Historical Annual Average Productions (Source: DrillingInfo)

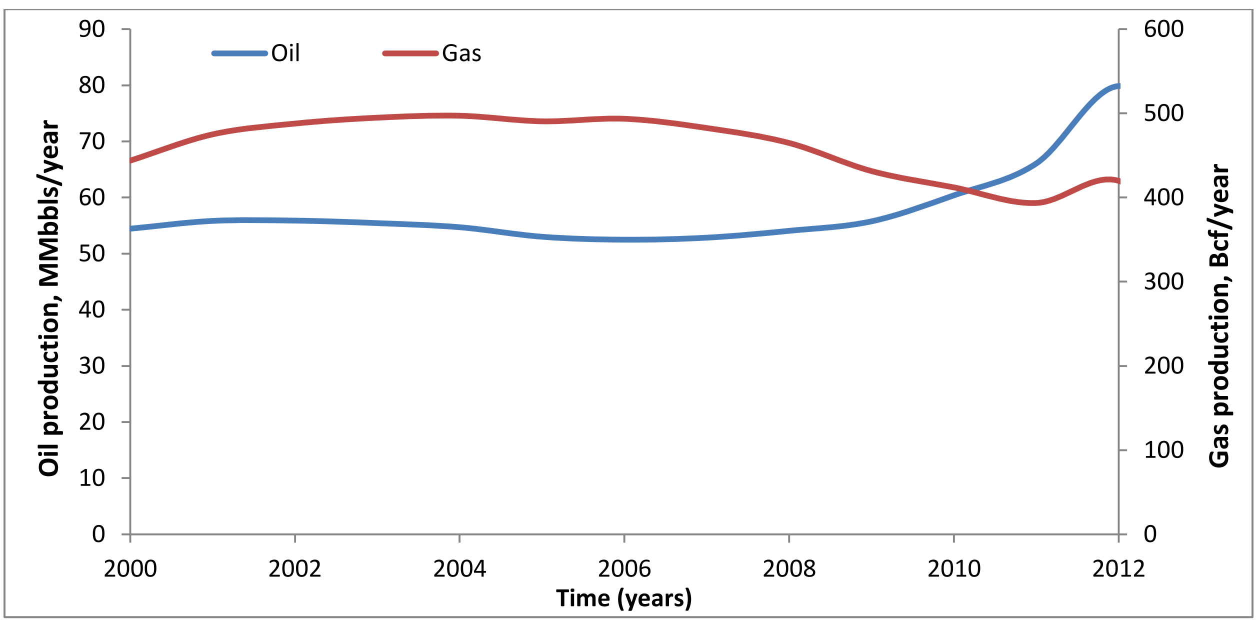


Figure E.15: New Mexico Portion of the Permian Basin: Last Thirteen Years Annual Average Productions (Source: DrillingInfo)

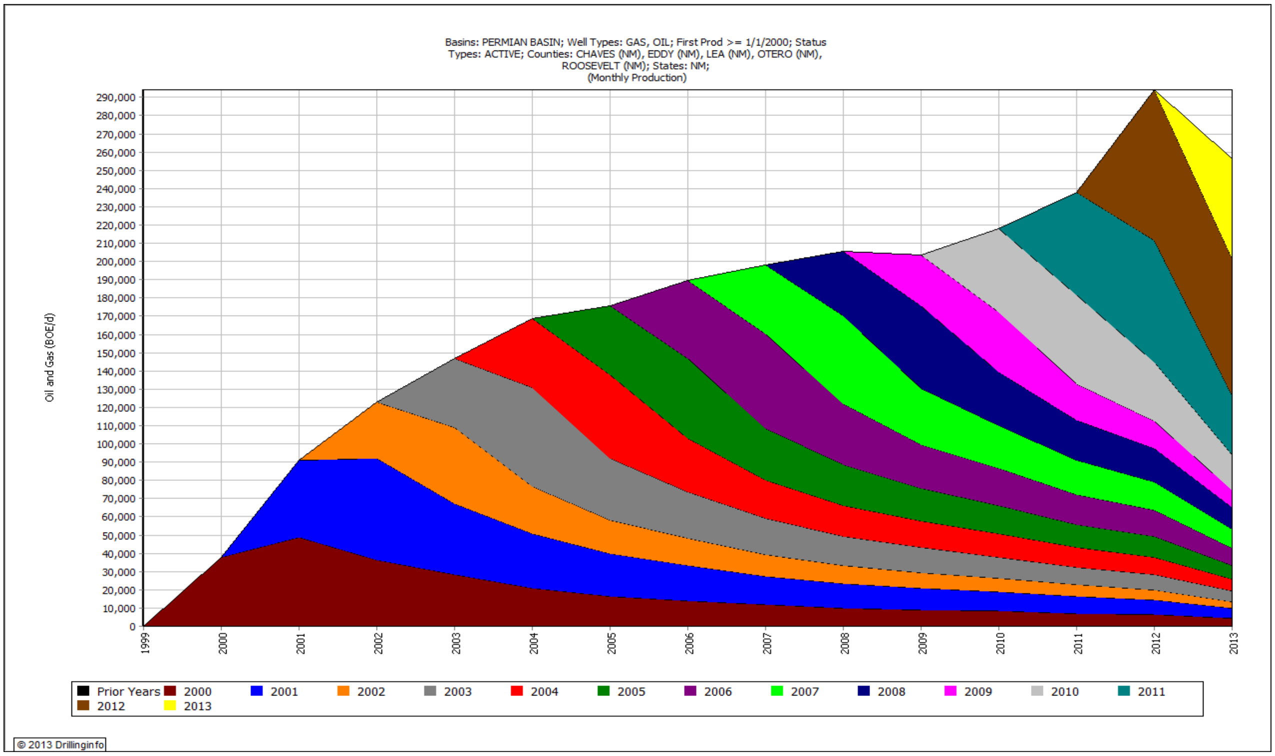


Figure E.16: New Mexico Portion of the Permian Basin: A Vintage Plot of Annual Cumulative Productions from 2000 (Source: DrillingInfo)

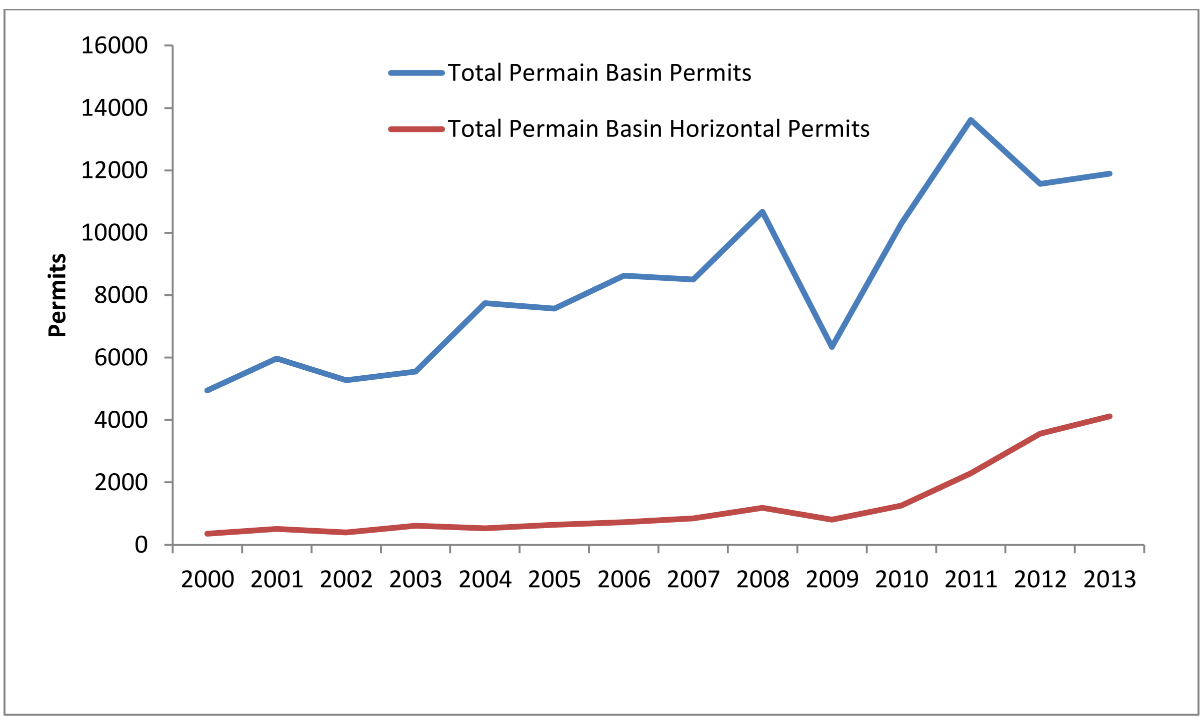


Figure E.17: Drilling Permit vs. Time Plot for the Entire Permian Basin (Source: DrillingInfo)

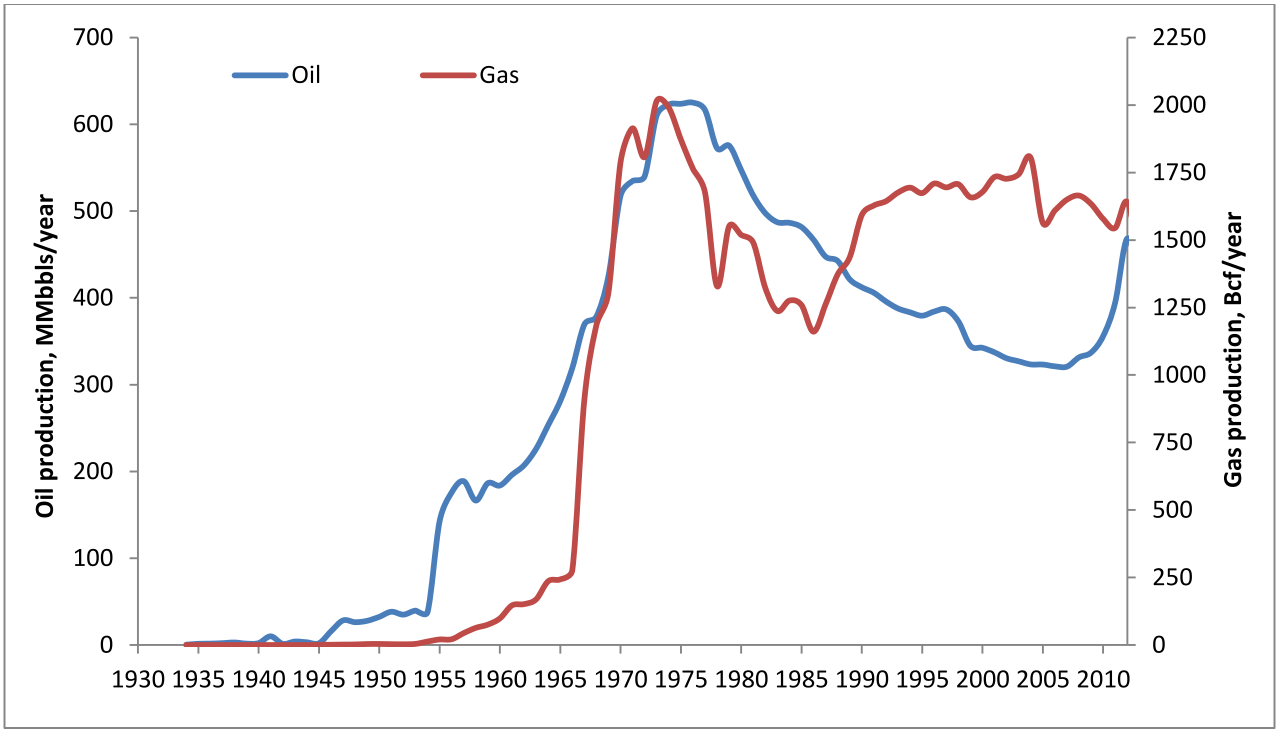


Figure E.18: All Historical Annual Average Productions in the Entire Permian Basin (Source: DrillingInfo)

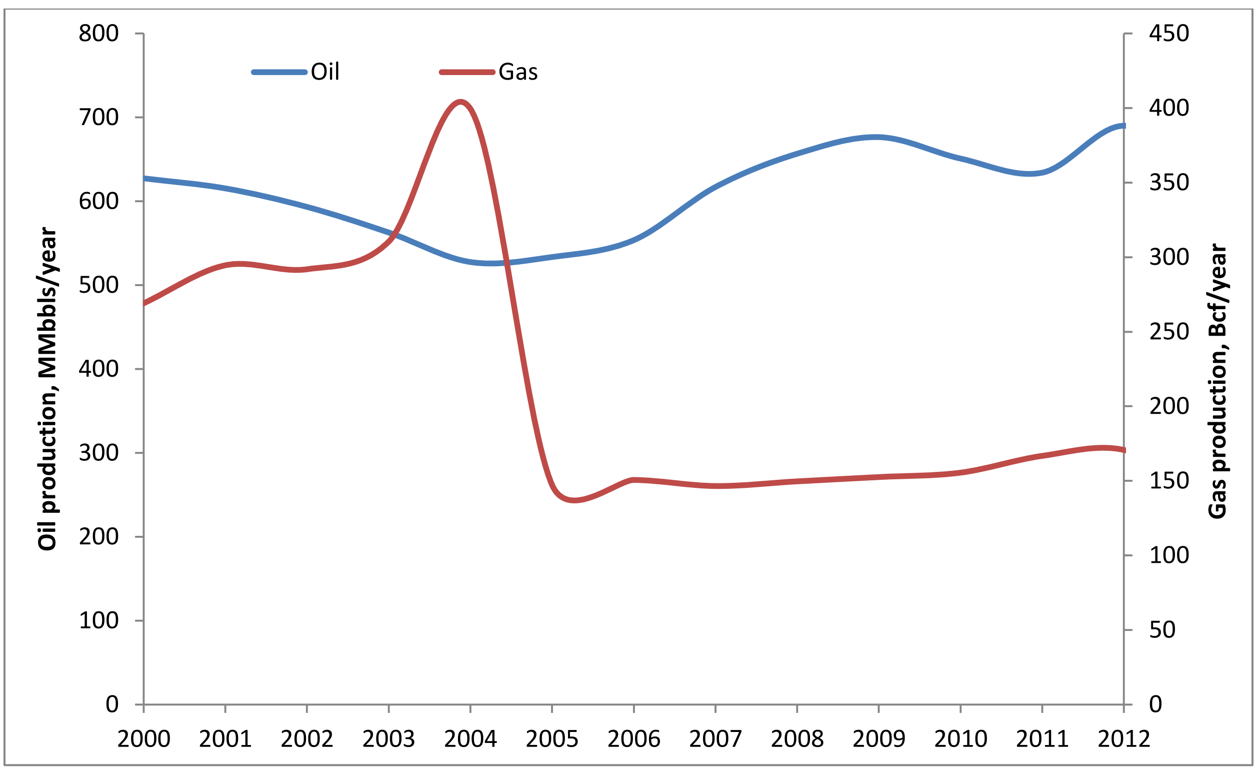


Figure E.19: Last Thirteen Year Annual Average Productions in the Entire Permian Basin (Source: DrillingInfo)

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