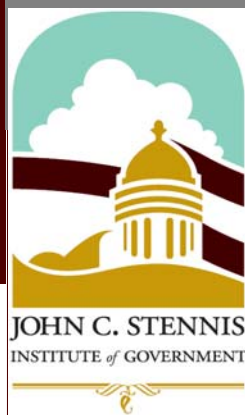




A Basic Overview of the Oil & Gas Industry in Mississippi



June 2013

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The Mission Statement of the John C. Stennis Institute of Government

Elected to the United States Senate in 1947 with the promise to "plow a straight furrow to the end of the row," John C. Stennis recognized the need for an organization to assist governments with a wide range of issues and to better equip citizens to participate in the political process. In 1976, Senator Stennis set the mission parameters and ushered in the development of a policy research and assistance institute which was to bear his name as an acknowledgment of his service to the people of Mississippi. Created as a service and research arm of Mississippi State University, the John C. Stennis Institute of Government was established on February 9, 1976. Announcing its formation during a two-day Forum on Politics honoring U.S. Senators John Stennis and Margaret Chase Smith, MSU President William L. Giles outlined the Institute's mission and goals. According to Giles, the Institute would seek to integrate research, service, and teaching activities to improve government in the state, as well as promote the training of students who seek careers in public service.

Thirty-seven years later, the Stennis Institute of Government has remained true to that initial charge. By providing meaningful, applied research to both local and state units of Mississippi government, the Institute brings a wealth of experience and knowledge to bear on real-world issues. Through its executive development programs, training opportunities, and technical assistance programs, the Institute provides support for today's policy-makers from the courthouse to the classroom. And, by playing an active role in the development of tomorrow's leaders, the Institute is working to ensure that Mississippi's future remains strong.

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Introduction

Since the discovery of gas and oil in 1903, Mississippi has produced significant quantities of hydrocarbon resources. With crude oil production of 24,212,000 thousand barrels in 2011¹, the U.S. Department of Energy ranked the State of Mississippi 14th in the nation. With proved crude oil reserves of 247 million barrels as of December 31, 2010², Mississippi exhibits strong potential for the development of oil and gas reserves with high market prices continuing to drive exploration of Mississippi's oil resources. Technological developments including horizontal drilling and hydraulic fracturing have enhanced the ability of producers to recover oil and natural gas from shale formations. During the late 1980s and early 1990s, deep shale gas production from the Barnett Shale in North Central Texas became commercially viable and, with these initial successes, producers expanded activities to the Haynesville, Marcellus, Woodford, Fayetteville, and Eagle Ford shale formations. More recently, development has begun to focus on the Tuscaloosa Marine Shale formation in Southeast Mississippi.

Multiple factors will impact the rate of development of the hydrocarbon resources in the state of Mississippi. The industry operates in a high risk environment, requires significant capital investment, and is subject to multiple variables that influence the level of investment and the rate of return on these investments. Variables impacting development may be industry wide, variables may be reservoir or field specific, and other variables may be unique to a specific operator. Industry wide factors include financial, operational, safety, environmental, and regulatory risk.

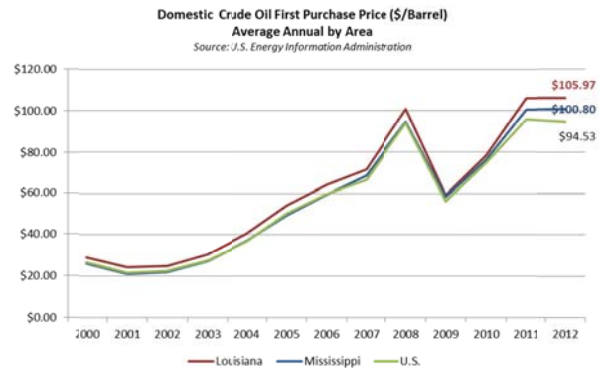
Market conditions, economic recessions, the state of capital markets, financial market turmoil, and the level of interest by investors in the oil and gas industry impact the ability of the firm to secure capital and maintain financing for continued development. Commodity prices and continued market demand are outside of the control of any individual firm. Prices received for oil are dependent upon global market conditions. Domestic natural gas prices fluctuate in response to U.S. economic conditions, weather patterns, the demand level and supply of substitute fuels, and the level of drilling activity and related supply. During the first half of 2012, natural gas prices reached a 10 year low.

During periods of sustained low prices, producers may shut-in or curtail existing production, reduce or stop new exploration, or engage in divestiture of holdings. All companies involved in the oil or gas industry are subject to the fluctuation in gas and oil prices; these prices tend to be volatile due to seasonality of demand. The price of oil and gas prices can materially affect the operations and financial position of firms in the industry. Most industry players enter into futures contracts and hedging agreements to manage price risk.

PAD District III domestic crude oil first purchase prices for Mississippi have trended downward from \$113.31 per barrel in March 2012 to \$98.28 in December 2012. In January and February 2013, prices

¹ U.S. Energy Information Administration, State Crude Oil Production. Note: this figure is slightly lower than the 25,881,175 barrels of oil found in publications of the Mississippi Oil & Gas Board due to differences in reporting periods.

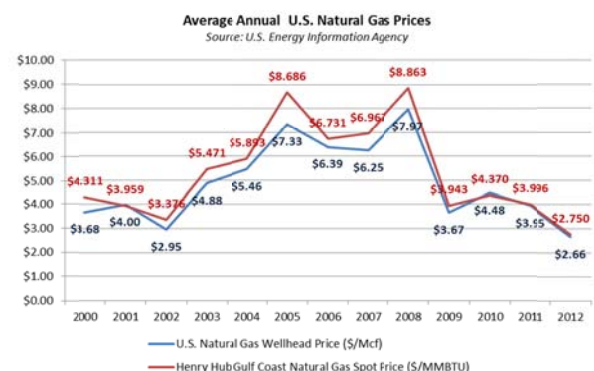
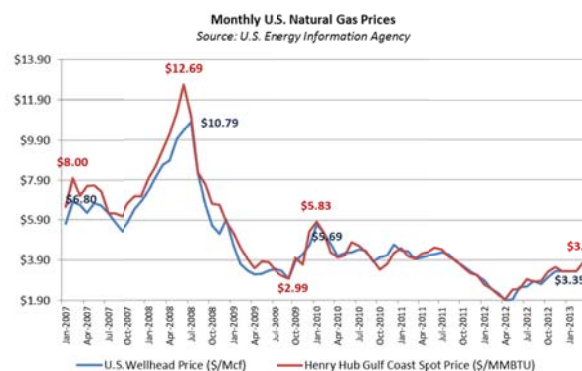
² U.S. Energy Information Administration, Petroleum and Other Liquids; Mississippi Crude Oil Proved Reserves



exhibited recovery, increasing to \$103.63 per barrel as of February 2013. As of June 2013, market oil traders were continuing to downgrade oil prices based on slow international economic growth in China, the U.S., the Eurozone, and the increasing strength of the U.S. dollar; OPEC reports that overall demand remained fundamentally unchanged; and the impact of increasing production in the U.S. on petroleum stockpiles. As of May 8, 2013, Light Sweet Crude futures prices were \$95.58 for June 2013; \$91.65 for June 2014; and \$84.00 for June 2017.

As of December 2012, the U.S. Natural Gas Wellhead price was \$3.35 per thousand cubic feet. The price of natural gas has exhibited high volatility in recent years. The increasing supply of natural gas due to new drilling in shale formations throughout the U.S. and the uncertain economic environment have placed downward pressure on natural gas prices. The market is still reacting to the growing supply of natural gas in the U.S., limitations associated with inadequate access to pipelines and access to refinery capacity, and related export capacity. The U.S. Energy Information Administration (EIA) predicts that colder winter temperatures forecast for 2014 will increase residential and commercial natural gas demand; EIA predicts that Henry Hub prices will increase from an average of \$3.92 per MMBtu in 2013 to \$4.10 per MMBtu in 2014.

Oil and gas prices are a major factor driving the exploration for and the production of oil and gas in the state of Mississippi. Not only do these prices impact the level of industry investment in exploration and the rate of production from wells in Mississippi, the amount of severance tax revenues associated with production is based upon the value (price) of oil and gas at the point of production.



The oil and gas industry is capital intensive. The ability to access short- and long-term capital and equity or to obtain bank financing and credit is essential to the industry. Access to credit and liquidity are key factors, particularly during the exploration and development phase when drilling costs and actual production or production decline is unknown. Early development drilling costs that are higher than anticipated and unanticipated completion delays negatively impact the cash flow from operations. Small firms with inadequate access to credit may be unable to successfully complete wells and bring production on line. Financial downturns or negative credit market conditions will adversely impact exploration, development, and production.

There are multiple operational risks in the oil and gas industry. The availability of drilling and other equipment, access to cost effective land, royalties, tax levies, access to water for hydraulic fracturing, weather, the availability and proximity of pipeline capacity, the availability of skilled labor, unexpected cost increases, and reservoir quality all impact the ability of the firm to complete projects and to optimize investments in development. As demand for rigs, equipment, and qualified field personnel increases in response to the number of wells being drilled, the cost of these production inputs will also increase; these increasing costs decrease the profit margin, cash flow and the capital available to drill new wells. Drilling operations may also be curtailed due to the following operating risks: title problems, equipment failures or accidents, or unexpected drilling conditions. Well blowouts, pipe failure, fires, abnormal pressure in formations, the release of contaminants into the environment, and re-entry into improperly plugged wells are common risks across the industry. Factors that increase costs, delay operating activities, or reduce the timing of production all impact the level and rate of new well development.

The oil and gas industry has significant exposure to environmental and regulatory risk. The industry is subject to regulation and intervention by governments at multiple levels. Federal, state, county, and municipal governments, as well as foreign governments or international regulatory bodies, may implement regulations and laws that affect the industry. These factors impact the cost of development and compliance and impact companies' existing and future investment in development. The continuous evolution of regulations related to carbon constraints, emission controls, and environmental policies increases risk and uncertainty in the industry. Changing accounting and tax policies also impact earnings, the valuation of assets and reserves, the cost of compliance, and ultimately, the investment and development decisions in the industry.

The industry must be in compliance with and has liability exposure under multiple federal laws to include: the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA); the Resource Conservation and Recovery Act, the Federal Water Pollution Control Act, the Oil Pollution Act, the Safe Drinking Water Act, the Federal Clean Air Act, the Endangered Species Act, and the Occupational Safety and Health Act. The Federal Energy Regulatory Commission regulates the transportation of natural gas via interstate pipelines. The trend in environmental regulation has been to increasingly place more limitations and restrictions on activities that may have environmental impact. These laws may result in more costly waste handling, storage, transport, disposal, and remediation requirements. The EPA has been studying the potential impacts of hydraulic fracturing, and legislation

The Role of the Mississippi Oil and Gas Board to Grant Pooling Rights

SEC. 53-3-7. Integration of interests; pooling agreements and orders.

(1) (a) When two (2) or more separately owned tracts of land are embraced within an established drilling unit or when there are separately owned interests in all or part of an established drilling unit the persons owning the drilling rights therein and the rights to share in the production therefrom may validly agree to integrate their interests and to develop their lands as a drilling unit. Where, however, such persons have not agreed to integrate their interests the board may, for the prevention of waste or to avoid the drilling of unnecessary wells, require such persons to integrate their interests and to develop their lands as a drilling unit. All orders requiring such pooling shall be made after notice and hearing, and shall be upon terms and conditions that are just and reasonable, and will afford to the owner of each tract the opportunity to recover or receive his just and equitable share of the oil and gas in the pool without unnecessary expense.

The portion of the production allocated to the owner of each tract included in a drilling unit formed by a pooling order shall, when produced, be considered as if it had been produced from such tract by a well drilled thereon.

(b) Except as otherwise provided for herein, in the event such pooling is required, the cost of development and operation of the pooled unit chargeable by the operator to the other interested owner or owners shall be limited to the actual expenditures required for such purpose not in excess of what are reasonable including a reasonable charge for supervision. In the event that the operator elects to proceed under the provisions of subsection (1) (b), and does not elect to seek alternate charges as provided for herein below, the notice procedure followed shall be in accordance with Section 53-1-21, Mississippi Code of 1972.

(c) For the purposes of this section, as to a drilling unit, the term "non-consenting owner" shall mean an owner of drilling rights which the owner has not agreed, in writing, to integrate in the drilling unit. The owner may own other drilling rights in the unit which the owner has agreed, in writing, to integrate in the unit and thereby also be a "consenting owner" as to the interest which the owner has agreed to integrate in the unit.

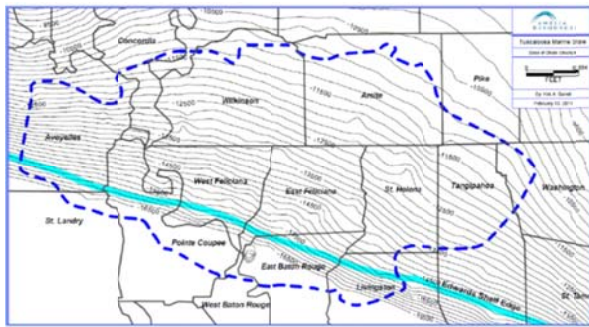
(2) (a) In the event that one or more owners owning not less than thirty-three percent (33%) of the drilling rights in a drilling unit voluntarily consent to the drilling of a unit well thereon, and the operator has made a good faith effort to (i) negotiate with each non-consenting owner to have said owner's interest voluntarily integrated into the unit, (ii) notify each non-consenting owner of the names of all owners of drilling rights who have agreed to integrate any interests in the unit, (iii) ascertain the address of each non-consenting owner, (iv) give each non-consenting owner written notice of the proposed operation, specifying the work to be performed, the location, proposed depth, objective formation and the estimated cost of the proposed operation, and (v) to offer each non-consenting owner the opportunity to lease or farm out on reasonable terms or to participate in the cost and risk of developing and operating the unit well involved on reasonable terms, by agreeing in writing, then the operator may petition the board to allow it to charge alternate charges as hereinafter set out (alternate to and in lieu of the charges provided for in subsection (1)(b) above).

has been proposed in Congress to implement federal regulation of these practices; if passed, these regulations could substantially impact future development of hydrocarbon resources.

At the state level, laws and regulations generally govern the industry through a permitting process. States normally have a bonding requirement for well operators and regulate the location and method of drilling and casing wells. States may also limit the allowable rate of production by well or proration unit, well spacing, and the operation and abandonment of wells or fields. States may also regulate the composition and disposal of the fluids and chemicals used by operators. State policies and decisions guide the unitization or pooling of properties. State may also levy ad valorem taxes on oil and gas reservoirs, or on equipment, machinery, tools, material or property being used in the production of oil and gas. Normally, these ad valorem taxes are levied and administered by local tax districts. High ad valorem taxes, particularly on marginal wells, may act as a disincentive to keeping them in production. In Mississippi, oil and gas statutes specifically exempt reserves and production equipment from ad valorem taxes.

Other factors that impact the exploration and development of oil and gas resources are specific to the unique characteristics of a geological formation or the properties of a specific reservoir. The character of the geological formation and reservoir properties vary widely, for example, the properties of the source rock and its porosity and permeability effect drilling

time, the cost of drilling, and well completion time and cost. In most cases, developers are uncertain of the total level of production and production decline curves that may be anticipated from specific investments in the development of new wells. For example, although there has long been interest in the Tuscaloosa Marine Shale in Mississippi, it is only recently that the confluence of horizontal drilling, hydraulic fracturing, and high oil and gas prices have changed the field level economics that are driving the current interest in the exploration and development of the hydrocarbon resources of the Tuscaloosa Marine Shale. Exploration of the Tuscaloosa Marine Shale is in a relatively early stage. Production levels and the long-term productivity of wells are not yet tested and are uncertain. Shale presents multiple drilling challenges to include the deep vertical depths of the wells, the need to drill long laterals, the variability of the shale rock quality, and the undulating character of shale zones.



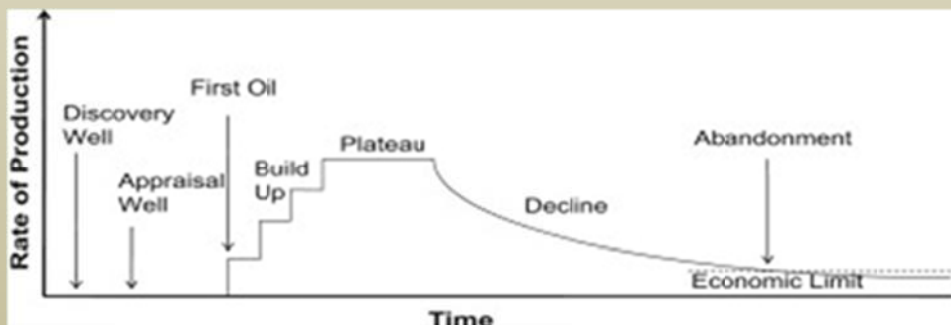
As shown in the map at left that outlines the areas of high resistivity (usually attributed to the presence of oil), Tuscaloosa Marine Shale wells are deep. Experience in Mississippi has seen the true vertical depth of the wellbore ranging between 12,000 and 13,000 feet and lateral lengths between 4,500 and 7,000 feet, depending upon the geographic location of the well. The development of hydrocarbon resources in shale is complex; identifying well

locations, mapping, stimulation methods, optimizing drilling strategies, and enhancing completion rates remain challenging. Experience in other shale plays (e.g. the Haynesville, Marcellus, or Eagle Ford) is not fully transferable to the Tuscaloosa Marine Shale. Drilling problems associated with the development of shale hydrocarbons include high pressure and high temperature, sloughing, cave-ins, and wellbore strength. These wells are expensive to drill; estimates reported by companies operating in the Tuscaloosa Marine Shale range from \$15 million to \$21 million per well. Industry technological advances in reservoir evaluation, accuracy and quality of drilling, and production management have enabled the optimization of ultimate recovery and production. However, the industry has not yet “cracked the code” of the Tuscaloosa Marine Shale. Industry growth, production estimates, and related revenues will be subject to change over time as new wells go into production and producers adapt drilling technology to the unique characteristics of the Tuscaloosa Marine Shale.

The future development of the hydrocarbon resources in the state of Mississippi will be associated with the well economics of reservoirs and fields within the state in competition with multiple alternative opportunities that exist throughout the U.S. and across the world, particularly in shale plays throughout the United States. The decision by any developer to invest in drilling wells within the state of Mississippi represents an opportunity cost for strategic capital investment in other geographic locations. This is particularly true for the developers currently engaged in the development of the Tuscaloosa Marine Shale in southwest Mississippi; all of the major developers currently investing in exploration of the Tuscaloosa Marine Shale have large holdings in other shale formations across the United States.

Production Decline Curves. The decline curve refers to the percentage annual reduction in the rate of production (in barrels per day) from an individual field or a group of fields. The production from an individual field can vary widely based upon multiple factors, including geology and the methods used to develop, complete, and operate the well(s) within a field. As a field is brought on-line, its rate of production typically will rapidly rise to an initial peak and then plateau. At some point, the rate of production will begin to decline. The time period from discovery to abandonment of a well can extend over multiple years. Decline rates may be higher for fields that are produced at a higher rate, leading to higher peaks, shorter plateaus, and steeper declines. Production quotas or production disruptions may reduce decline rates. New technology and government policies can also impact decline rates and the life cycle of production. Optimized completion techniques may flatten the decline curve over time for a specific well. For example, drilling activities that use hydraulic fracturing may use increased levels of proppant and frac fluid per stage to improve production levels and flatten the production decline curve.

Most oil and gas wells produce with an exponential decline; some oil and gas wells decline at a faster rate, called hyperbolic or double exponential decline. Recent research has found that some wells using hydraulic fracturing tend to exhibit steeper, harmonic decline curves. Multiple factors may impact the production decline curve, to include: well placement, completion and stimulation treatments, increases in lateral lengths, the number of frac stages, and the fluid and proppant volume and composition. Cambridge Energy Research Associates (CERA) estimated that the weighted decline for all production from oil fields worldwide was 4.5 percent. The International Energy Agency (IEA) estimated that the average annual decline rate for all post-peak fields worldwide was 4.1% and 4.5% per year. Hook et al. found 5.5% per year. However, CERA and IEA estimates include giant oil fields, which by definition have production of more than 100,000 barrels per day and are not representative of production decline from U.S. shale formations. Recent research by Gary Swindell published by the Society of Petroleum Engineers on 1,041 oil wells in 10 Eagle Ford counties found a normalized oil decline of 76 percent with a hyperbolic exponent of .25 and a normalized gas decline of 60% with a hyperbolic exponent of .40.



Field economics represent a balance between the cost of drilling and bringing a well into production as compared to revenues generated from future, anticipated production. A major risk factor in the industry is unanticipated high costs for bringing a well into production (drilling costs, completion costs, and unanticipated delays) combined with the lack of certainty regarding the productive value of a well over its lifetime. The productive value of a well is based upon the level of production as measured by either barrels of oil or cubic feet of gas on a monthly basis across the lifetime of a well, decline curves for production over time, and the quality of the output. The estimated ultimate recovery (EUR) plays an important role in the development of hydrocarbon resources. Operators will cease production when the revenue per unit of production, net of production costs, royalties, and severance taxes equals the required minimum level of profit per unit of production. Increases in net revenues increase the productive lifetime of a well; improved technologies, lower production costs, lower severance tax rates, or high prices for oil or gas all contribute to net revenue increases and are associated with industry development decisions. The productive value of a well is also based upon the ratio of oil content and the density (gravity) of the crude oil that is produced from a specific geographic formation or reservoir.

Crude oil contains a range of liquid and solid hydrocarbons. Crude oil is classified as heavy or light based upon its density; it is also described by its American Petroleum Industry (API) gravity in degrees. Oils range from approximately 10⁰ to 70⁰ API; heavy oil crude is below 20⁰ API and light crude is above 20⁰ API. The most dense and tarriest heavy crude is under 10⁰ and the most productive light crude will have a gravity of approximately 45⁰ API. As oil increases in gravity above 45⁰ it yields fewer valuable products and decreases in value. Crude oil with a low content of free sulphur, hydrogen sulfide or other sulfur-containing compounds, and carbon dioxide is called sweet. Sulfur and sulfur-containing compounds must be removed from crude oil before it can be refined; sweet crude has higher value because it is less expensive to refine. For example, one factor that is impacting the development of the Tuscaloosa Marine Shale is the output of Louisiana Light Sweet Crude, which sells at a price premium, and output from wells in the Tuscaloosa Marine Shale have a higher oil content as compared to the output from the Eagle Ford and many other U.S. shale formations.

Table 1: Comparative Price of Crude Oil by Type 2012 and 2013

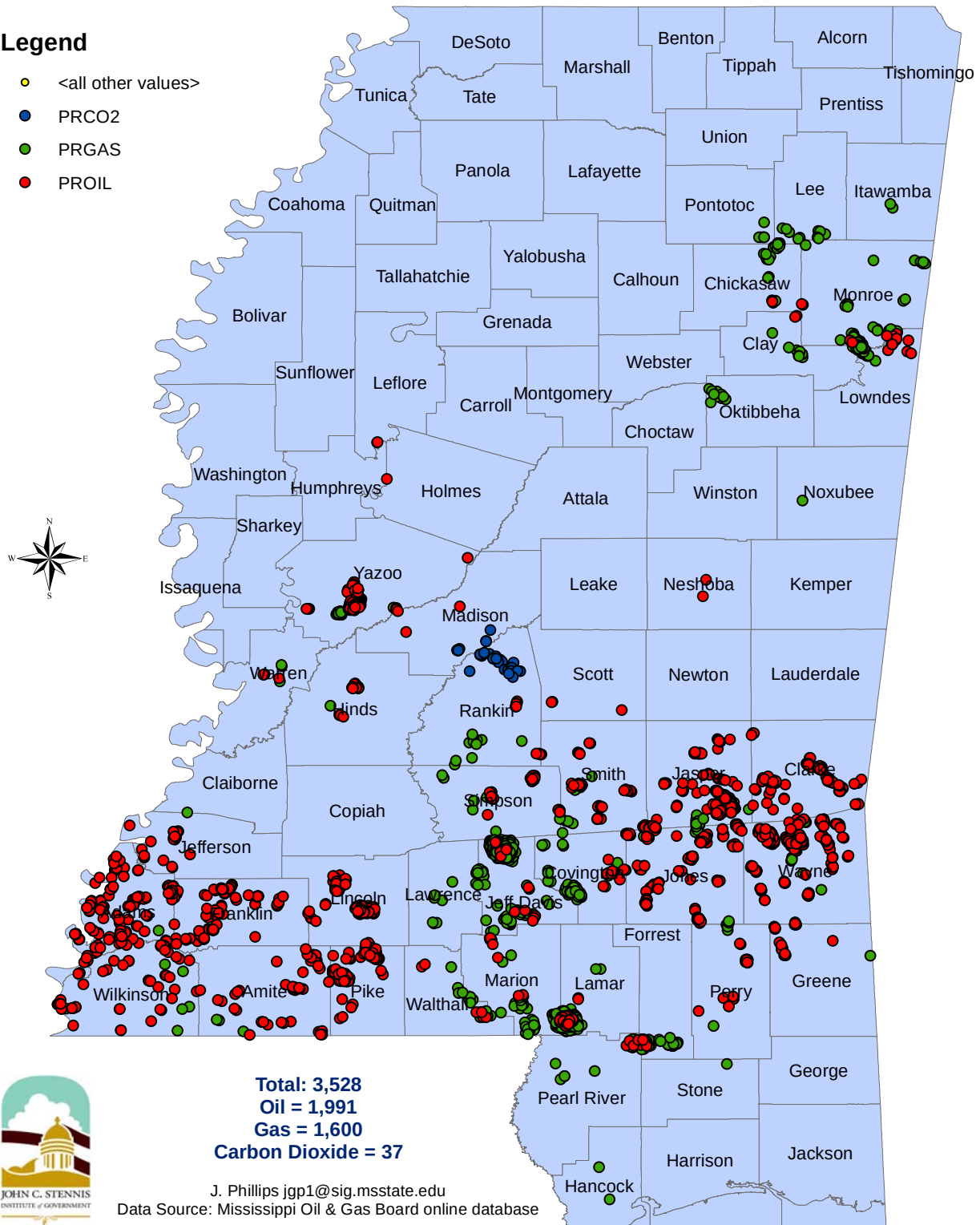
Crude Stream	12-Sep	12-Oct	12-Nov	12-Dec	13-Jan	13-Feb
Alaska North Slope	\$98.29	\$94.44	\$92.06	\$93.43	\$98.13	\$98.62
Heavy Louisiana Sweet	\$107.16	\$105.91	\$104.62	\$104.37	\$108.09	\$108.12
Louisiana Light Sweet	\$109.45	\$104.90	\$104.20	\$106.50	\$112.63	\$109.97
Mars Blend	\$105.08	\$102.99	\$101.39	\$101.87	\$105.45	\$106.76
West Texas Intermediate	\$94.31	\$88.95	\$86.07	\$85.09	\$88.71	\$89.12
West Texas Sour	\$89.68	\$83.90	\$80.57	\$77.68	\$78.43	\$78.62
Wyoming Sweet	\$86.88	\$85.44	\$82.07	\$79.86	\$87.44	\$88.29

Source: U.S. Energy Information Administration

Producing Oil, Gas, and Carbon Dioxide Wells as of June 20,2013

Legend

- <all other values>
- PROIL
- PRGAS
- PROIL



Map 1: Producing Oil, Gas, and Carbon Dioxide Wells in Mississippi as of June 2013

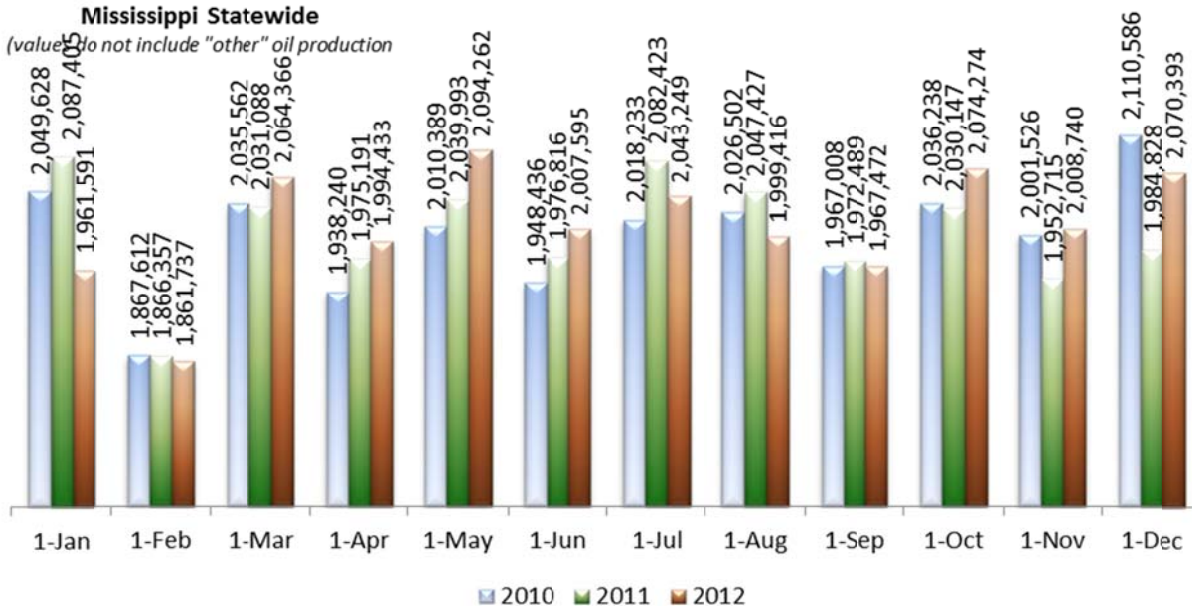
Oil and Gas Production in Mississippi

For the one-year period from January 1, 2012 through December 1, 2012, statewide oil production was 24,147,528 barrels of oil and 436,913,738 thousand cubic feet of gas; these production figures do not include “other oil” (13,748 barrels) and “other gas” (9,089,066 Mcf) production. From 2011 to 2012, oil production in Mississippi increased by 100,649 barrels and gas production declined by 6,761,900 Mcf.

Monthly Oil Production (Bbls) 2012

Mississippi Statewide

(values do not include “other” oil production)



Monthly Gas Production (Mcf) Mississippi Statewide

(values do not include “other” gas production)

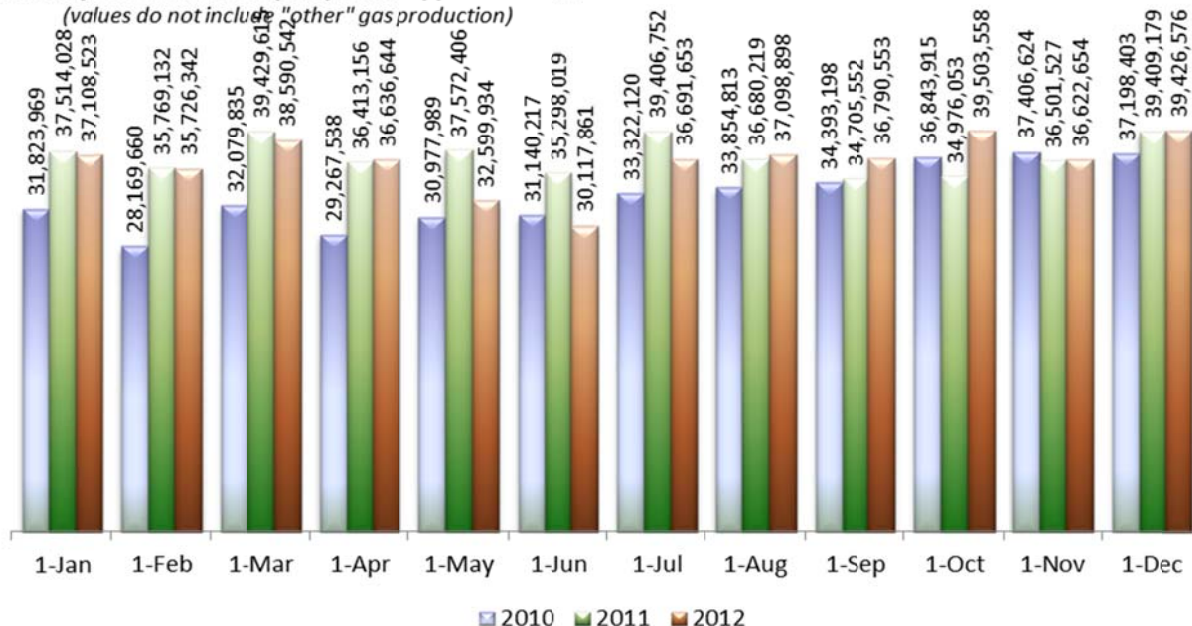
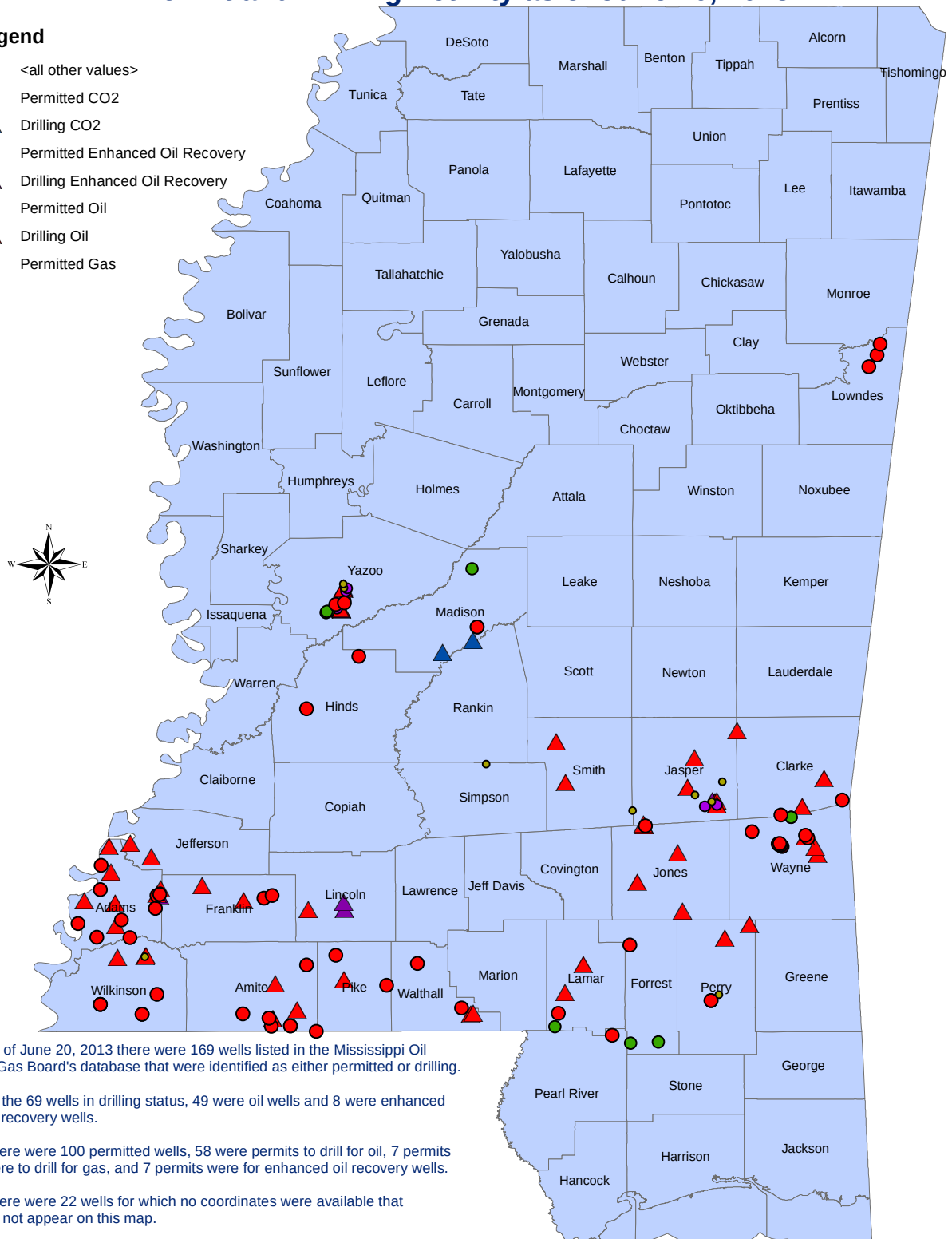


Figure 1: Comparative Monthly Production of Oil and Gas 2010, 2011, and 2012 in Mississippi

Permit and Drilling Activity as of June 20, 2013

Legend

- <all other values>
- Permitted CO2
- ▲ Drilling CO2
- Permitted Enhanced Oil Recovery
- ▲ Drilling Enhanced Oil Recovery
- Permitted Oil
- ▲ Drilling Oil
- Permitted Gas



Map 2: Oil, Gas, and CO2 Permit and Drilling Activities as of June 2013

Oil and Gas Development

The number of original permits to drill, and the acreage related to those permits, provide a measure of the development in Mississippi's oil and gas industry. The price of oil and gas has impacted the Mississippi oil and gas industry. Not only has gas production declined, but new permits to drill for gas have decreased by approximately 70 percent over the period from 2009 to 2012. Over the same period, new permits to drill for oil have increased by approximately 115 percent. As shown in the table below, acreage associated with original permits to drill for gas in the state of Mississippi have been declining over the period from 2009 to 2012; over the same period, acreage associated with new permits to drill for oil have increased by over 32,000 acres. With the advent of new drilling technologies which include horizontal drilling and the use of a resource play hub model where multiple horizontal wells are drilled and tied into a single surface location or well pad, the average size of oil drilling units have increased significantly; from 2011 to 2012, the average acreage associated with oil drilling units more than doubled from 112 acres to 275 acres. For example, in southwest Mississippi, where exploration of the Tuscaloosa Marine Shale is taking place, the average size of a drilling unit is approximately 1,000 acres. Oil developers use a resource place hub model to achieve efficiency; this model means shorter travel distances for rigs and hydraulic fracturing crews, supplies delivered in bulk to centralized resource play hub locations, reduced vehicle traffic and emissions, and less movement of fluids and chemicals.

Table 2: Mississippi Original Permits to Drill Issued by the MS Oil and Gas Board January 1, 2009 through December 31, 2012

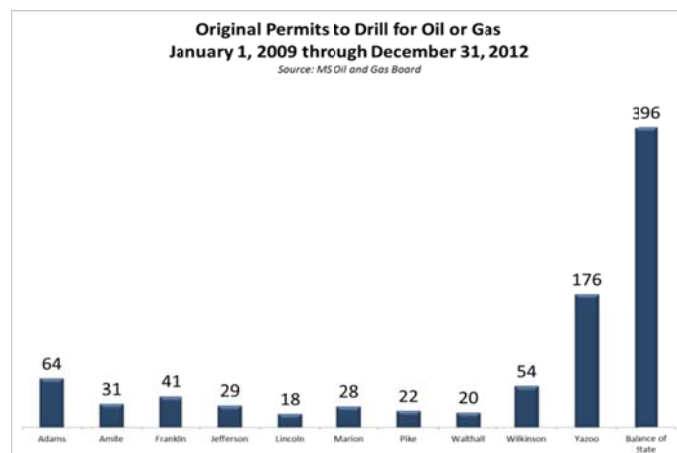
Statewide Original Permits to Drill Issued by the Mississippi Oil and Gas Board January 1 through December 31				
	2009	2010	2011	2012
Total	169	218	266	226
Total Acres (excluding unitized wells)	45,986.37	53,531.84	37,821.80	51,138.36
Total Permits for Gas Wells	72	69	30	23
Total Acreage Permitted for Gas Wells	39,583.37	42,030.97	15,396.88	12,630.10
Average Acreage per Gas permit	549.8	609.14	513.23	549.13
Total Permits for Oil Wells	95	165	236	203
Permits with Unitized Acreage (oil)	20	52	41	63
Total Acreage Permitted for Oil Wells excluding unitized permits	6,403	10,220.87	21,984.91	38,508.30
Average Acreage per Oil permit	85.8	106.47	112.7	275.06
<u>Other Original Permits to Drill:</u>				
Stratigraphic	2	~	13	
Carbon Dioxide	~	1	~	
Monitor/Observation	~	~	2	
Minor variance may exist due to MSOGB reporting methods. For example, in the permit database the date for a permit may be 12/29/2008 but the Permit number is 2009-OPD-204 and the permitting information may be contained in the 2009 database.				

Mississippi Well Status as of June 20, 2012		
Total Wells in Database		32,819
Active Injection		1,243
Enhanced Oil Recovery - Injection	587	
Fluid Disposal	4	
Gas Storage Cavern	21	
Gas Storage Reservoir	120	
Liquefied Petroleum Gas Storage	12	
Water Injection Disposal	499	
Commingled for Production		5
Completion Report Received		32
Oil	26	
Gas	3	
Monitor/Observation	1	
Fluid Disposal	1	
CO2	1	
Domestic Gas Well		4
Domestic Water Well		24
Drilling		65
Oil	48	
CO2	2	
Enhanced Oil Recovery	8	
Gas Storage Cavern	1	
Monitor/Observation	4	
Water Injection - Disposal	2	
Producing Wells		3,528
CO2	37	
Gas	1,600	
Oil	1,891	
Permitted to Drill or Re-enter		99
CO2	2	
Enhanced Oil Recovery	7	
Gas	17	
Monitor/Observation	7	
Oil	56	
Water Injection - Disposal	9	
Permitted for Conversion from Production to Injection		4
Permitted for Conversion from Injection to Production		9
Appears Plugged & Abandoned/No Records		343
Dry Hole	60	
Fluid Disposal	2	
Gas	74	
Monitor/Observation	1	
Oil	183	
Water Injection - Disposal	22	
Water Source	1	
Appear Plugged & Abandoned/Surveyor Inspection		377
Dry Hole	355	
Gas	3	
Oil	16	
Stratigraphic	2	
Water Injection - Disposal	1	
Abandoned - Unapproved		1
Abandoned - Unapproved Surveyor Inspections		4
Permit Cancelled		140
Permit Cancelled	8	
CO2 Production	1	
Enhanced Oil Recovery	1	
Expired Location	17	
Gas	65	
Gas Storage Reservoir	1	
Oil	46	
Stratigraphic	1	
Closed In		1,754
CO2	4	
Gas	385	
Oil	1,365	
Completion Report NP		15
Dry Hole	5	
Oil	8	
Gas	1	
CO2	1	
Dry and Abandoned		540
Expired Permits		1,980
Inactive		3
Junked and Abandoned		4
Not Entered		21
No Report Submitted		1
No Report Required		120
Orphan Plugged and Abandoned		406
Plugged and Abandoned		21,640
Plugged & Abandoned - Surveyor Inspected		257
Potential Orphan Well		2
Standby Well		160
Temporarily Abandoned		11
Intent to Abandon Approved		25

As of June 2012, there was oil or gas production occurring in 42 of Mississippi's 82 Counties. The Mississippi Oil and Gas Board's database contains information on 32,819 wells. There are 3,528 wells that are producing gas, oil, or CO₂ and there are 1,243 active injection wells in the state. As of June 2012, there were 99 wells permitted to drill or to re-enter; of these, 56 were oil wells. There were 65 wells being drilled as of June 2012; of these, 48 were oil wells.

Over the period from January 1, 2009 through December 31, 2012, approximately 879 original permits to drill for oil or gas were issued by the Mississippi Oil and Gas Board. Over the four-year period 10 counties in southwest Mississippi have accounted for over 50 percent of all original permits to drill for oil or gas

The figure below shows the total number of original permits for oil and gas that were authorized over the period from January 1, 2009 through December 31, 2012 for Adams, Amite, Franklin, Jefferson, Lincoln, Marion, Pike, Walthall, Wilkerson, and Yazoo counties and the balance of original permits to drill for oil that were issued statewide excluding these 10 counties. As shown, oil permitting activities in Adams and Yazoo counties have been significant. In these counties, a strategy of enhanced oil recovery using CO₂ and re-entry of plugged or abandoned wells is being widely utilized to increase oil production. One example is provided by the activities of Denbury Onshore, LLC. in Yazoo County targeting the Tinsley CO₂ Oil Pool; as of December 1, 2011, there were 77 flowing or producing wells in the Tinsley



CO₂ Oil Pool being operated by Denbury Onshore, LLC. producing 176,078 barrels of oil; as of August 1, 2012, there were 93 flowing or producing wells in the Tinsley CO₂ Oil Pool producing 246,578 barrels of oil.

Denbury Resources is the largest oil and natural gas producer in the state of Mississippi. Denbury's enhanced oil recovery strategy uses carbon dioxide to increase production in mature or depleted oil fields. Denbury owns all known major sources of CO₂ in the state of Mississippi and purchased the Jackson Dome in February 2001. Denbury transports CO₂ to tertiary oil fields in Mississippi from the Jackson Dome through pipelines the company either owns or controls through long-term leases. Denbury's 183 mile NEJD CO₂ Pipeline serves fields in southwest Mississippi to include Little Creek, Mallalieu, McComb, Brookhaven, and Lockhart Crossing. Its Free State CO₂ Pipeline serves oil fields in east Mississippi to include the Eucutta, Soso, Martinville and Heidelberg fields; the company's Delta CO₂ Pipeline serves fields northwest of the Jackson Dome to include the Tinsley Field in Yazoo County; and the Sonat Mississippi Pipeline serves fields in southwest Mississippi, west of the NEJD Pipeline.

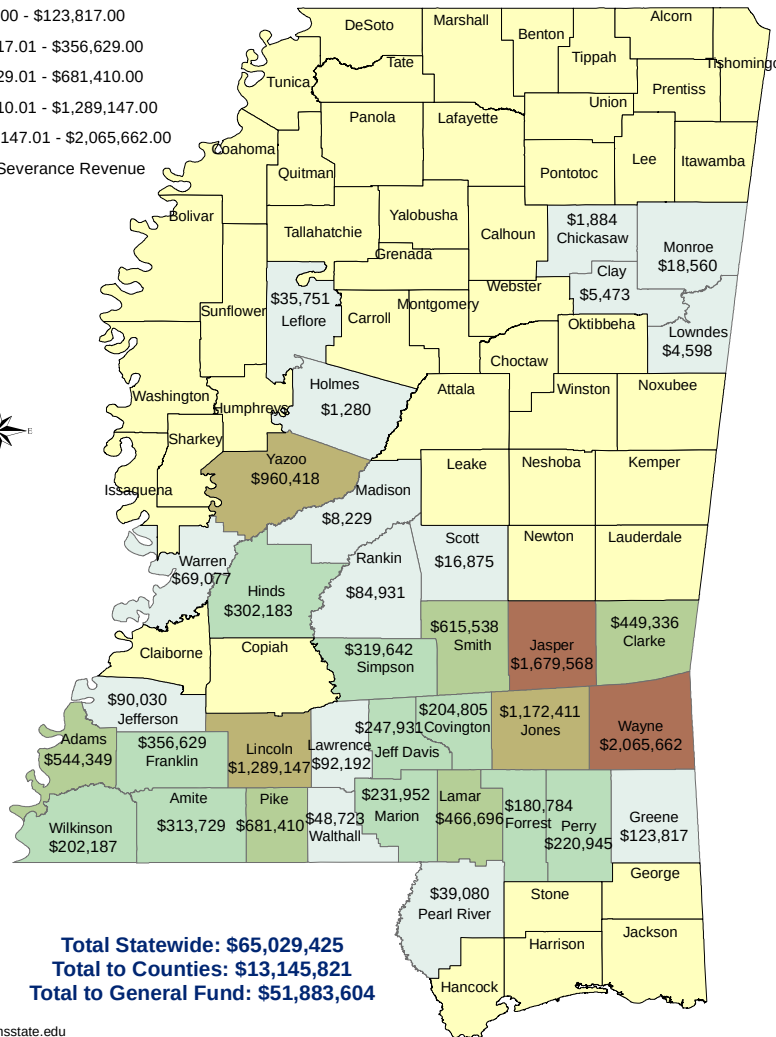
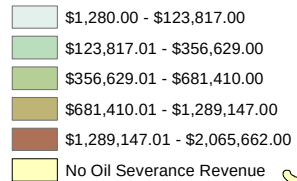
As shown in the table below, average daily oil production by Denbury in 2011 was approximately 30,444 barrels of oil. Extrapolating this production based on 30 days of production per month indicates that production from Mississippi wells would approximate 10.9 million barrels of oil annually. Denbury's 2011 Annual Report indicates that the average sale price of oil from their Gulf Coast activities was \$105.23 per barrel. Under Mississippi Code (§27-25-503), oil severance taxes are levied at the rate of three (3) percent of the value of the oil at the point of production on oil produced using enhanced oil recovery methods in which carbon dioxide is used, provided that the carbon dioxide is transported by pipeline to the oil well site. Using these assumptions, it can be estimated that Denbury's severance tax contribution to Mississippi is approximately \$34.6 million annually. This would indicate that severance tax revenues from Denbury represented approximately 42 percent of the \$82.6 million in oil severance tax revenues reported in the Annual Report by the Mississippi Department of Revenue for the year ending June 30, 2011.

Table 3: Estimated Denbury Proved Reserves in Mississippi Oil Fields 2011

Denbury Proved Reserves in Mississippi Oil Fields			
Field	Proved Oil (MBbls) Reserves as of December 31, 2011	2011 Average Daily Production (Bbls)	PV-10 Value ¹
Brookhaven	13,552	3,255	\$561,962,000
McComb Area	6,540	1,997	\$265,354,000
Mallalieu	8,033	2,693	\$300,810,000
Other	6,667	3,016	\$273,064,000
Heidelberg	31,096	3,448	\$930,480,000
Eucutta	8,720	3,121	\$367,952,000
Soso	6,291	2,347	\$234,858,000
Martinville	988	462	\$24,465,000
Tinsley	31,325	6,743	\$1,415,835,000
Cranfield	7,628	1,123	\$343,077,000
Heidelberg (non-tertiary)	9,880	2,239	\$373,661,000
Total	130,720	30,444	\$5,091,518,000
<i>Source: Denbury Annual Report 2011</i>			
1. PV-10 is the estimated future gross revenue to be generated from the production of proved reserves, net of estimated future production, development and abandonment costs, and before income taxes, discounted to a present value using an annual discount rate of 10%.			

Oil Severance Tax Revenues to Mississippi Counties 2010

Legend

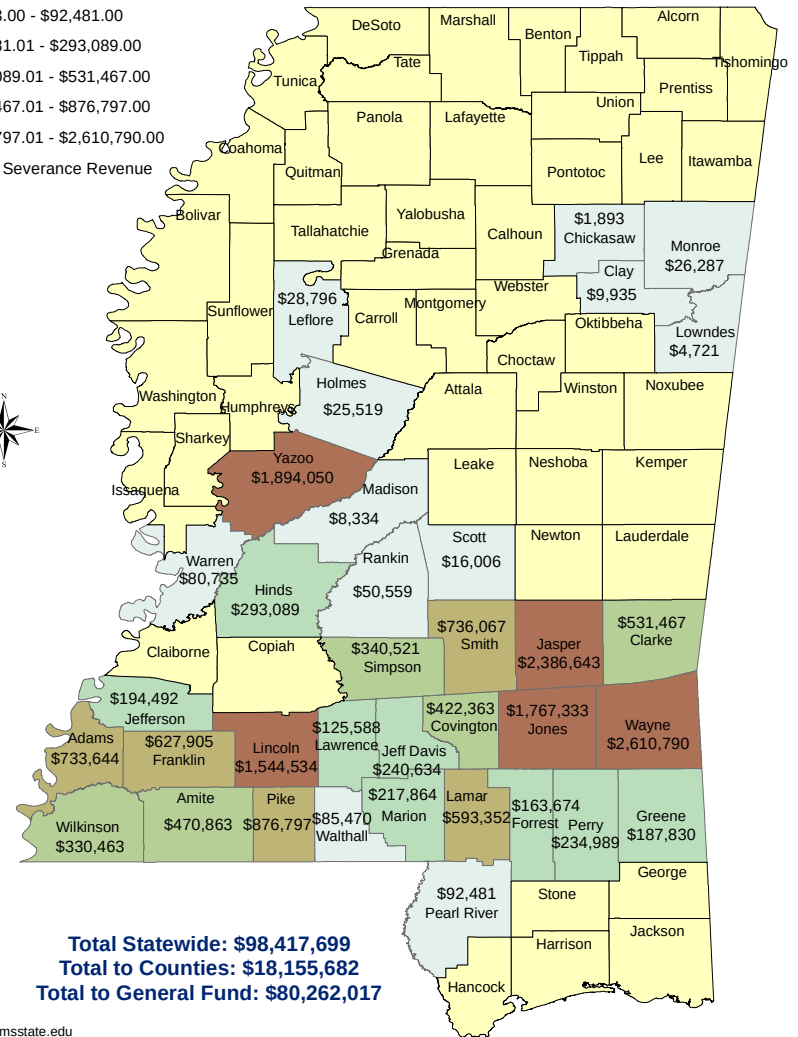
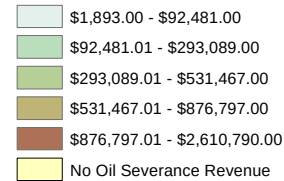


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Data Source: Mississippi Department of Revenue

Oil Severance Tax Revenues to Mississippi Counties 2012

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Data Source: Mississippi Department of Revenue

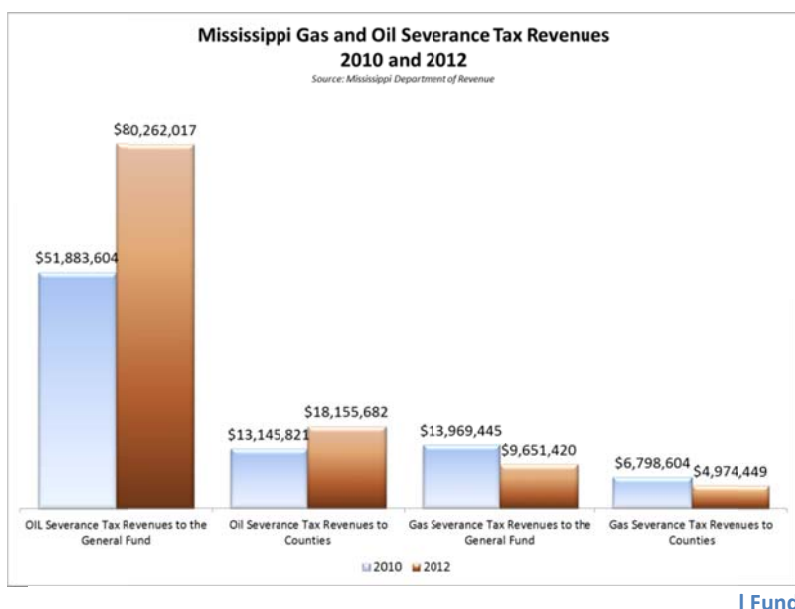
Map 3: Oil Severance Tax Revenues to Mississippi Counties 2010 and 2012

Gas and Oil Severance Tax Revenues

In 2012, 42 of Mississippi's 82 counties received either oil or gas severance tax revenues. In 2012, Gas and Oil Severance tax revenues in the state of Mississippi totaled \$113,043,568; this represented an increase of approximately \$27.2 million (an increase of 32 percent) over the 2-year period from 2010 to 2012. Oil Severance tax revenues statewide were \$98.4 million and Gas Severance Tax revenues were \$14.6 million in 2012. Over the 2-year period, Gas Severance tax revenues declined by \$6,142,180 and Oil Severance tax revenues increased by \$33,388,274 million.

The impact of changes in the Mississippi oil and gas industry differentially impact individual counties within the state of Mississippi. For

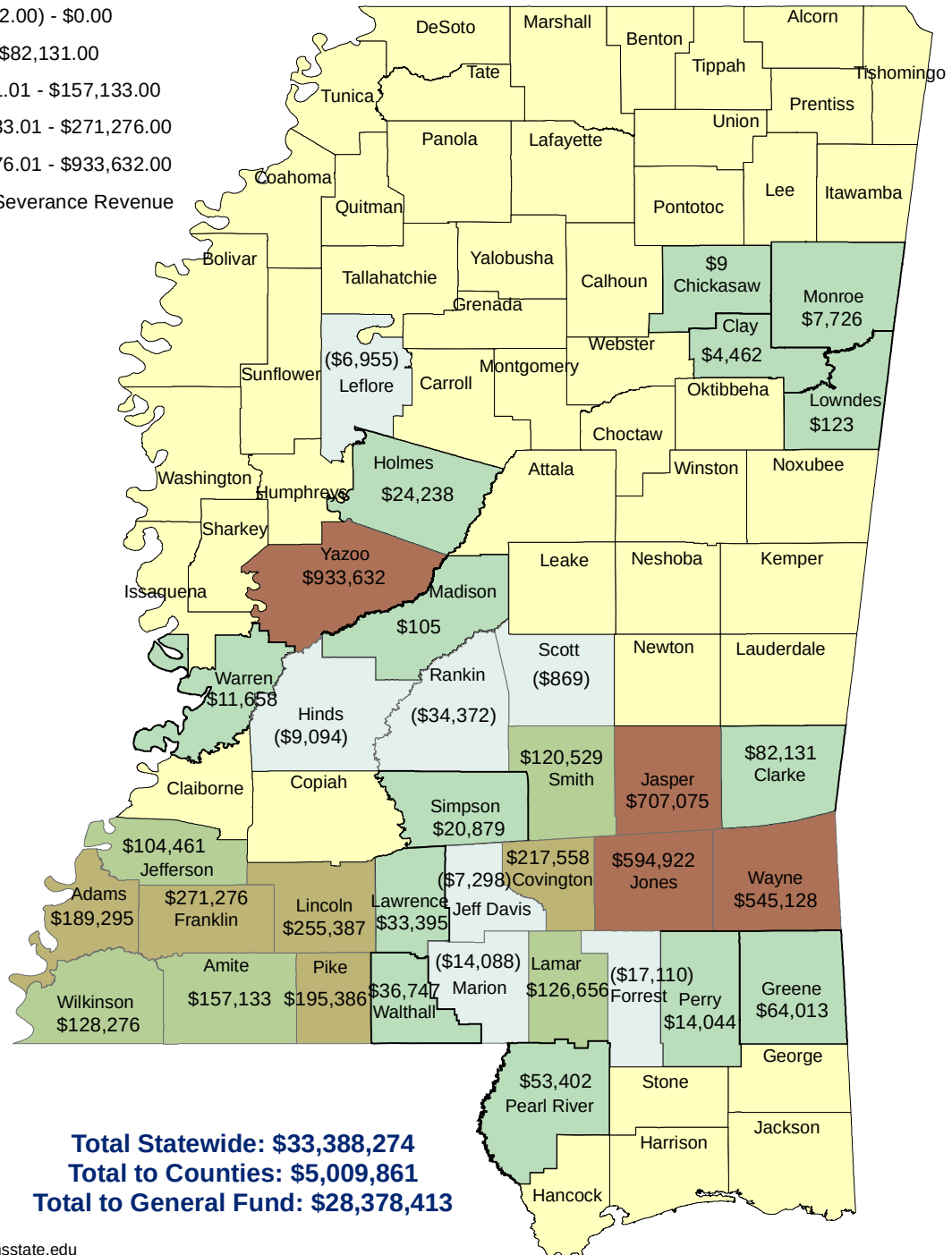
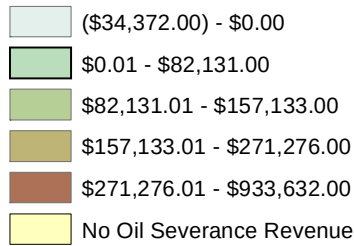
example, in Amite County, annual oil production increased from 426,071 barrels of oil in 2011 to 555,289 barrels of oil in 2012; this represents a production increase of 129,218 barrels of oil (+30.3%) and an increase of 8,980 Mcf of gas production over the one-year period from 2011 to 2012. Over the two year period from 2010 to 2012, oil production in Amite County increased by 184,168 barrels



of oil – a production increase of 49.6 percent. From 2011 to 2012, oil production associated with five pools in Amite County declined by a total of 81,921; however, total oil production of 213,428 barrels from the Marine Shale Oil Pool and the Tuscaloosa Marine Shale Oil Pool compensated for production reductions from the five pools with declining production. A similar scenario was exhibited for gas production in Amite County; three pools exhibited a decline in gas production of 66,949 over the one year period from 2011 to 2012. However, gas production from the Marine Shale Oil Pool and the Tuscaloosa Marine Shale Oil Pool exhibited a combined increase of 59,571 Mcf; although the increased production from these two pools did not completely offset the reduced gas production from other pools located in Amite County, this new production did minimize the impact of potential reductions in associated severance tax revenues.

Change in Oil Severance Tax Revenues to Mississippi Counties 2010 to 2012

Legend



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Data Source: Mississippi Department of Revenue

Map 4: Change in Oil Severance Tax Revenues to Mississippi Counties between 2010 and 2012

Among the 42 Mississippi counties that receive Oil or Gas Severance tax revenues, 38 counties receive gas severance tax revenues and 35 counties receive revenues from oil severance taxes. Among the 35 Mississippi counties that receive revenues from oil severance tax, 28 counties experienced an increase in oil tax revenues and 7 counties experienced a decline in oil tax revenues over the 2-year period from 2010 to 2012. Among the counties receiving oil severance tax revenues, the four with the highest oil severance tax revenues in 2012 were Wayne, Jasper, Yazoo, Jones; these counties also experienced the largest dollar increase in oil severance tax revenues over the two-year period from 2010 to 2012.

Many counties in Mississippi also experienced a high percentage increase in oil severance tax revenues over the two year period from 2010 to 2012; these counties include Holmes, Pearl River, Jefferson, Covington, Franklin, and Wilkinson (see Table 4).

Among the 38 Mississippi counties that received gas severance tax revenues in 2012, 32 counties experienced a decrease in gas severance tax revenues over the two-year period from 2010 to 2012 and six counties experienced an increase in gas severance tax revenues. Among the counties that experienced an increase in gas severance tax revenues from 2010 to 2012, Rankin and Wayne counties experienced the greatest dollar increase with an increase of \$211,144 and \$113,324, respectively. Among the 32 counties experiencing a decline in gas severance tax revenues from 2010 to 2012, Jefferson Davis and Jasper counties

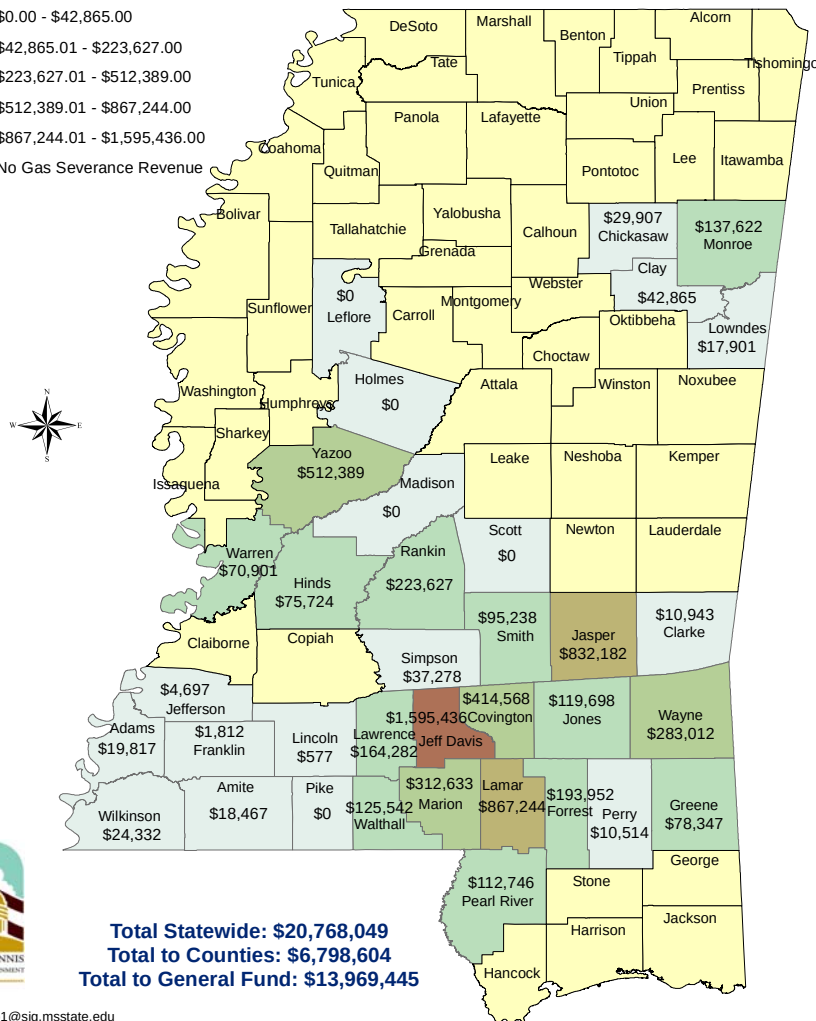
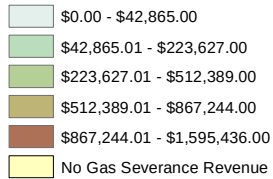
Table 4: Oil Severance Tax Revenues Percent Change 2010 to 2012

COUNTY	Oil Revenue 2010	Oil Revenue 2012	Change 2010 to 2012	% Change 2010 to 2012
ADAMS	\$ 544,349.04	\$ 733,643.83	\$189,294.79	34.77%
AMITE	\$ 313,729.48	\$ 470,862.83	\$157,133.35	50.09%
CHICKASAW	\$ 1,883.70	\$ 1,892.57	\$8.87	0.47%
CLARKE	\$ 449,336.00	\$ 531,466.93	\$82,130.93	18.28%
CLAY	\$ 5,473.23	\$ 9,934.88	\$4,461.65	81.52%
COVINGTON	\$ 204,805.00	\$ 422,362.60	\$217,557.60	106.23%
FORREST	\$ 180,783.73	\$ 163,674.17	(\$17,109.56)	-9.46%
FRANKLIN	\$ 356,628.73	\$ 627,904.94	\$271,276.21	76.07%
GREENE	\$ 123,816.63	\$ 187,829.57	\$64,012.94	51.70%
HINDS	\$ 302,182.72	\$ 293,089.02	(\$9,093.70)	-3.01%
HOLMES	\$ 1,280.30	\$ 25,518.64	\$24,238.34	1893.18%
JASPER	\$ 1,679,567.88	\$2,386,642.69	\$707,074.81	42.10%
JEFFERSON	\$ 90,030.39	\$ 194,491.70	\$104,461.31	116.03%
JEFFERSON DAVIS	\$ 247,931.42	\$ 240,633.50	(\$7,297.92)	-2.94%
JONES	\$ 1,172,411.02	\$1,767,332.70	\$594,921.68	50.74%
LAMAR	\$ 466,695.71	\$ 593,351.88	\$126,656.17	27.14%
LAWRENCE	\$ 92,192.44	\$ 125,587.87	\$33,395.43	36.22%
LEFLORE	\$ 35,750.95	\$ 28,796.28	(\$6,954.67)	-19.45%
LINCOLN	\$ 1,289,146.96	\$1,544,534.24	\$255,387.28	19.81%
LOWNDES	\$ 4,597.90	\$ 4,720.61	\$122.71	2.67%
MADISON	\$ 8,228.99	\$ 8,333.58	\$104.59	1.27%
MARION	\$ 231,951.80	\$ 217,864.03	(\$14,087.77)	-6.07%
MONROE	\$ 18,560.39	\$ 26,286.64	\$7,726.25	41.63%
PEARL RIVER	\$ 39,079.80	\$ 92,481.36	\$53,401.56	136.65%
PERRY	\$ 220,945.00	\$ 234,988.58	\$14,043.58	6.36%
PIKE	\$ 681,410.45	\$ 876,796.58	\$195,386.13	28.67%
RANKIN	\$ 84,930.58	\$ 50,558.60	(\$34,371.98)	-40.47%
SCOTT	\$ 16,874.91	\$ 16,006.23	(\$868.68)	-5.15%
SIMPSON	\$ 319,641.82	\$ 340,520.70	\$20,878.88	6.53%
SMITH	\$ 615,537.89	\$ 736,066.62	\$120,528.73	19.58%
WALTHALL	\$ 48,722.61	\$ 85,469.57	\$36,746.96	75.42%
WARREN	\$ 69,077.19	\$ 80,735.49	\$11,658.30	16.88%
WAYNE	\$ 2,065,661.50	\$2,610,789.66	\$545,128.16	26.39%
WILKINSON	\$ 202,186.64	\$ 330,463.02	\$128,276.38	63.44%
YAZOO	\$ 960,418.00	\$1,894,049.52	\$933,631.52	97.21%

Source: Mississippi Department of Revenue Annual Reports

Gas Severance Tax Revenues to Mississippi Counties 2010

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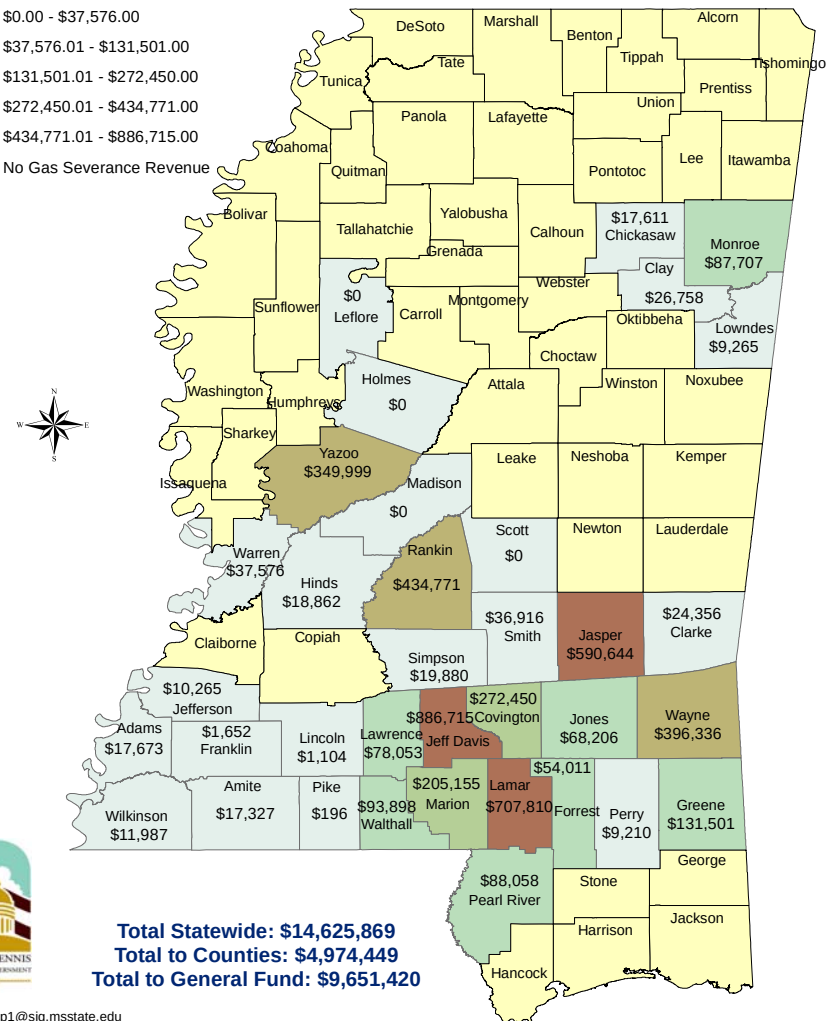
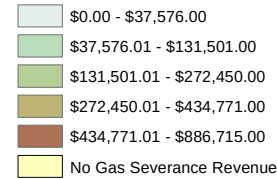


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Data Source: Mississippi Department of Revenue

Gas Severance Tax Revenues to Mississippi Counties 2012

Legend



Phillips jgp1@sig.msstate.edu

Data Source: Mississippi Department of Revenue

Map 5: Gas Severance Tax Revenue to Mississippi Counties 2010 and 2012

Table 5: Total Oil and Gas Severance 2012

County	Total Oil & Gas Severance Tax Revenues 2012	Net Change in Oil and Gas Severance Tax Revenues 2010 to 2012
Adams	\$751,317.27	\$187,151.47
Amite	\$488,189.73	\$155,992.85
Chickasaw	\$19,503.42	(\$12,287.52)
Claiborne	\$2,486.89	(\$1,934.62)
Clarke	\$555,823.07	\$95,544.04
Clay	\$36,692.89	(\$11,645.68)
Covington	\$694,812.98	\$75,440.11
Forrest	\$217,685.06	(\$157,050.28)
Franklin	\$629,557.13	\$271,115.96
Greene	\$319,330.31	\$117,166.31
Hancock	\$14,971.05	(\$6,747.64)
Hinds	\$311,951.17	(\$65,955.60)
Holmes	\$25,518.64	\$24,238.34
Itawamba	\$1,435.36	(\$547.55)
Jasper	\$2,977,286.82	\$465,536.73
Jeff Davis	\$1,127,348.53	(\$716,018.75)
Jefferson	\$204,756.48	\$110,029.28
Jones	\$1,835,538.34	\$543,428.89
Lamar	\$1,301,162.09	(\$32,777.71)
Lawrence	\$203,640.46	(\$52,833.59)
Lee	\$13,171.74	(\$2,800.05)
Leflore	\$28,796.28	(\$6,954.67)
Lincoln	\$1,545,638.39	\$255,914.21
Lowndes	\$13,985.34	(\$8,513.53)
Madison	\$8,333.58	\$104.59
Marion	\$423,019.12	(\$121,566.14)
Monroe	\$113,993.63	(\$42,188.80)
Oktibbeha	\$225,427.81	(\$74,267.52)
Pearl River	\$180,539.02	\$28,712.79
Perry	\$244,198.71	\$12,739.87
Pike	\$876,992.70	\$195,582.25
Pontotoc	\$7,490.30	(\$992.21)
Rankin	\$485,330.05	\$176,772.34
Scott	\$16,006.23	(\$868.68)
Simpson	\$360,400.63	\$3,480.97
Smith	\$772,982.61	\$62,206.23
Stone	\$8,514.01	(\$3,561.72)
Walthall	\$179,367.69	\$5,102.97
Warren	\$118,311.35	(\$21,667.28)
Wayne	\$3,007,125.86	\$658,452.74
Wilkinson	\$342,450.20	\$115,931.81
Yazoo	\$2,244,048.10	\$771,241.24

Source: Mississippi Department of Revenue

experienced the largest dollar amount decrease of \$708,720 and \$241,538, respectively. In addition to these two counties, there were five other counties (Covington, Forrest, Lamar, Marion, and Yazoo) that experienced a decline in gas severance tax revenues that exceeded \$100,000.

Among the 32 Mississippi counties that receive severance tax revenues from both oil and gas, 24 of these counties experienced a decline in gas severance tax revenues from 2010 to 2012; however, in 11 of these counties, increased revenues from oil production offset losses in gas severance tax revenues. There were four counties (Jefferson Davis, Forrest, Marion, and Hinds) that experienced a decline in severance tax revenues from both oil and from 2010 to 2012.

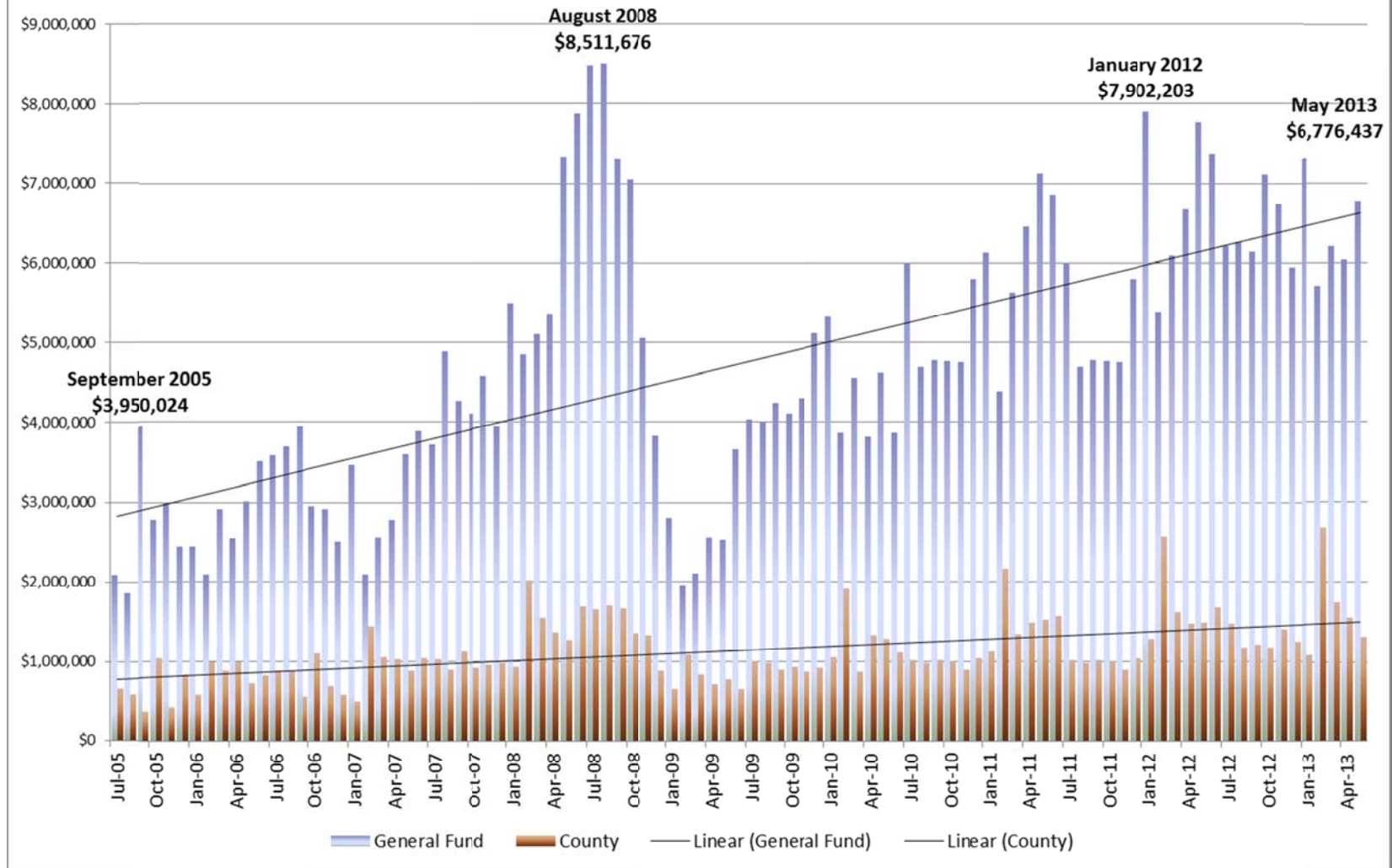
Table 6: County Gas Severance Tax Revenue 2010 and 2012

COUNTY	Gas Revenue 2010	Gas Revenue 2012	Change 2010 to 2012	% Change 2010 to 2012
ADAMS	\$19,816.76	\$17,673.44	(\$2,143.32)	-10.82%
AMITE	\$18,467.40	\$17,326.90	(\$1,140.50)	-6.18%
CHICKASAW	\$29,907.24	\$17,610.85	(\$12,296.39)	-41.12%
CLAIBORNE	\$4,421.51	\$2,486.89	(\$1,934.62)	-43.75%
CLARKE	\$10,943.03	\$24,356.14	\$13,413.11	122.57%
CLAY	\$42,865.34	\$26,758.01	(\$16,107.33)	-37.58%
COVINGTON	\$414,567.87	\$272,450.38	(\$142,117.49)	-34.28%
FORREST	\$193,951.61	\$54,010.89	(\$139,940.72)	-72.15%
FRANKLIN	\$1,812.44	\$1,652.19	(\$160.25)	-8.84%
GREENE	\$78,347.37	\$131,500.74	\$53,153.37	67.84%
HANCOCK	\$21,718.69	\$14,971.05	(\$6,747.64)	-31.07%
HINDS	\$75,724.05	\$18,862.15	(\$56,861.90)	-75.09%
ITAWAMBA	\$1,982.91	\$1,435.36	(\$547.55)	-27.61%
JASPER	\$832,182.21	\$590,644.13	(\$241,538.08)	-29.02%
JEFFERSON	\$4,696.81	\$10,264.78	\$5,567.97	118.55%
JEFFERSON DAVIS	\$1,595,435.86	\$886,715.03	(\$708,720.83)	-44.42%
JONES	\$119,698.43	\$68,205.64	(\$51,492.79)	-43.02%
LAMAR	\$867,244.09	\$707,810.21	(\$159,433.88)	-18.38%
LAWRENCE	\$164,281.61	\$78,052.59	(\$86,229.02)	-52.49%
LEE	\$15,971.79	\$13,171.74	(\$2,800.05)	-17.53%
LINCOLN	\$577.22	\$1,104.15	\$526.93	91.29%
LOWNDES	\$17,900.97	\$9,264.73	(\$8,636.24)	-48.24%
MARION	\$312,633.46	\$205,155.09	(\$107,478.37)	-34.38%
MONROE	\$137,622.04	\$87,706.99	(\$49,915.05)	-36.27%
OKTIBBEHA	\$299,695.33	\$225,427.81	(\$74,267.52)	-24.78%
PEARL RIVER	\$112,746.43	\$88,057.66	(\$24,688.77)	-21.90%
PERRY	\$10,513.84	\$9,210.13	(\$1,303.71)	-12.40%
PIKE	\$0.00	\$196.12	\$196.12	N/A
PONTOTOC	\$8,482.51	\$7,490.30	(\$992.21)	-11.70%
RANKIN	\$223,627.13	\$434,771.45	\$211,144.32	94.42%
SIMPSON	\$37,277.84	\$19,879.93	(\$17,397.91)	-46.67%
SMITH	\$95,238.49	\$36,915.99	(\$58,322.50)	-61.24%
STONE	\$12,075.73	\$8,514.01	(\$3,561.72)	-29.49%
WALTHALL	\$125,542.11	\$93,898.12	(\$31,643.99)	-25.21%
WARREN	\$70,901.44	\$37,575.86	(\$33,325.58)	-47.00%
WAYNE	\$283,011.62	\$396,336.20	\$113,324.58	40.04%
WILKINSON	\$24,331.75	\$11,987.18	(\$12,344.57)	-50.73%
YAZOO	\$512,388.86	\$349,998.58	(\$162,390.28)	-31.69%

Source: Mississippi Department of Revenue

Comparison of Oil Severance Tax Revenue to the General Fund and to Counties from July 2005 through May 2013 with Growth Trendlines

Data Source: MS Department of Revenue Monthly Report of Revenue Transfers



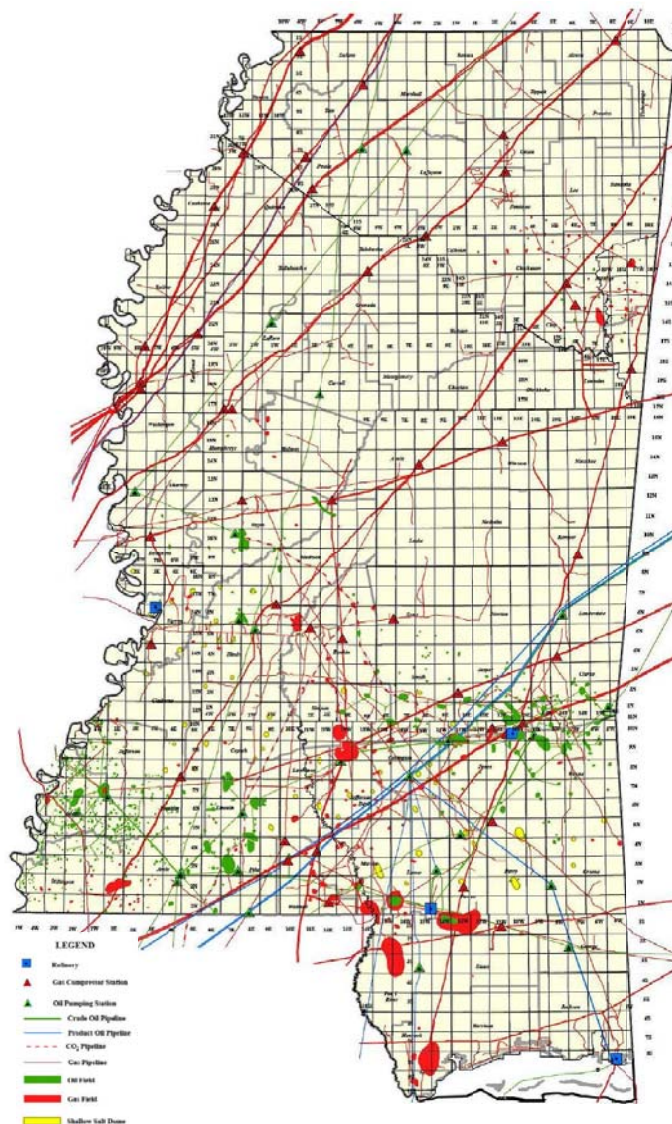
Privilege and Property Tax on Oil and Gas Pipelines

In addition to severance tax revenues from the production of oil and gas, Mississippi receives revenues from oil and gas permit fees, privilege tax on oil and gas pipelines, and ad valorem tax on oil and gas pipelines.

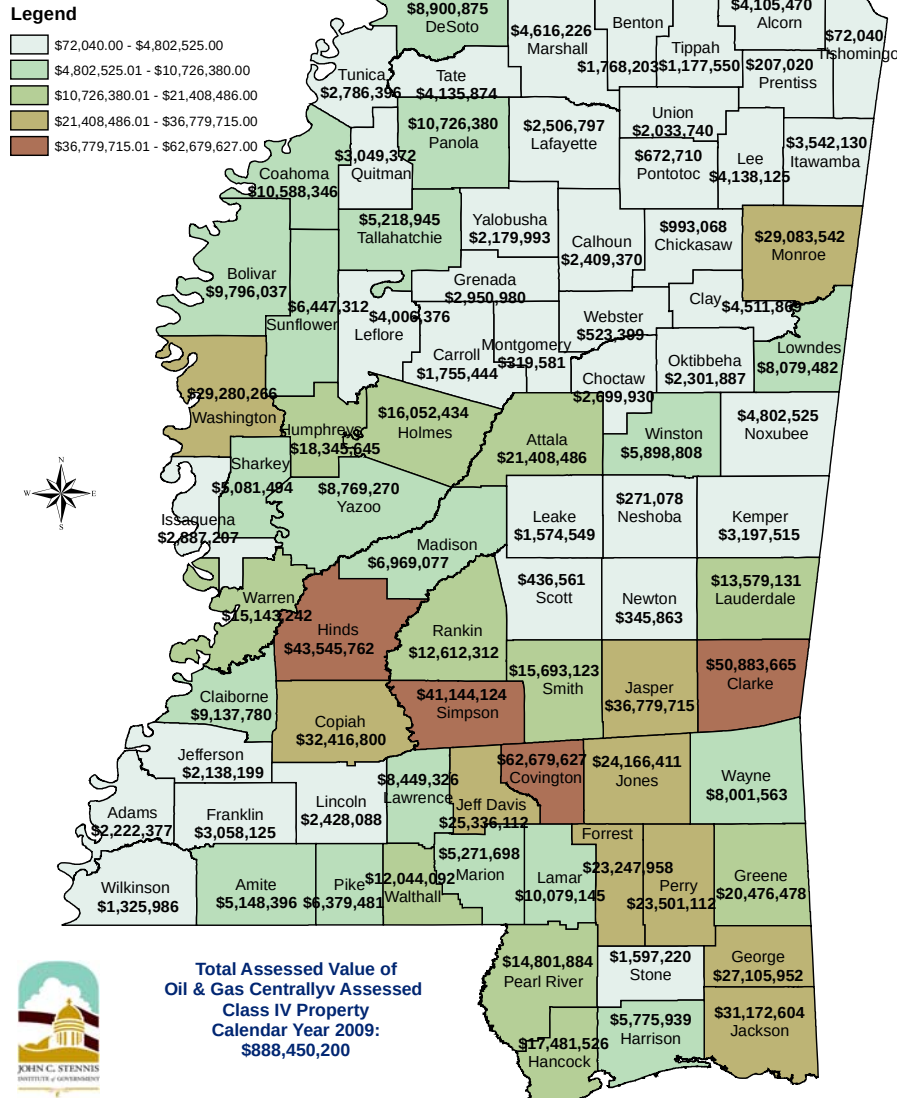
Pipeline companies that operate interstate and intrastate trunk pipeline in or through the state of Mississippi pay an annual privilege tax for each mile of pipeline (§27-15-165) based upon the diameter of the pipe; this tax ranges from \$15 per mile for pipe with a diameter of less than twelve inches to \$125 per mile for pipe having a diameter of over 26 inches. Privilege tax is not levied on pipelines, known as service lines, used solely for distributing gas and other petroleum products in or near cities, towns, and villages to the ultimate consumer. On average, revenue to the state of Mississippi from the privilege tax on pipelines is approximately \$300,000.

In the state of Mississippi, ad valorem taxes on oil and gas pipelines are centrally assessed as utilities (§27-15-151) by the Mississippi Department of Revenue using a unitary valuation to assess the operating property of oil and gas pipeline companies in the state with property in more than one county. Oil and gas pipelines are treated as Class IV property and assessed at a rate of 30% of value (§27-35-301 through §27-35-343). The assessed value of pipeline is allocated to each county based upon a pro rata basis and is then taxed based upon each county's millage rate. In the state of Mississippi, oil (§27-25-523) and natural gas (§27-25-523) production *personal* property, including wellheads, drilling rigs, and downhole equipment is exempt from property tax if severance tax has been paid on production associated with that personal property.

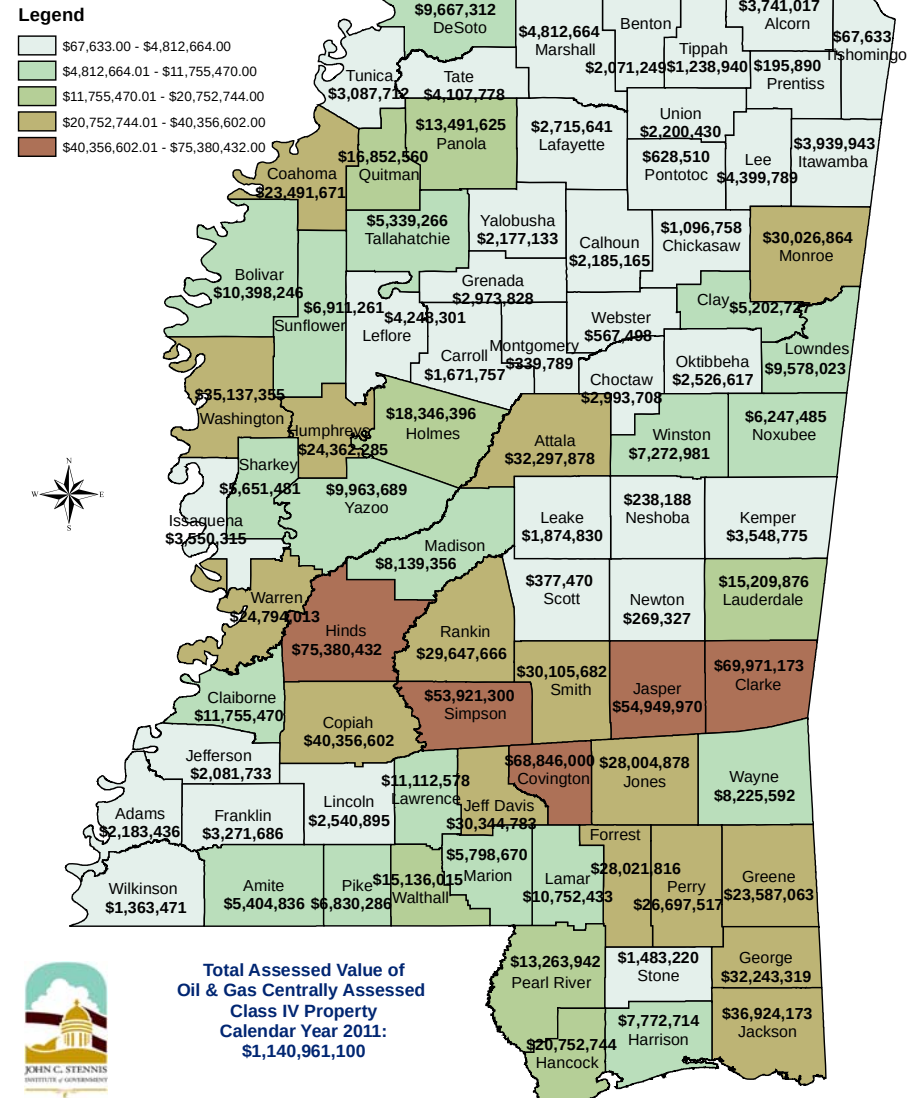
Gathering lines are assessed locally even when they cross county lines. Prior to 1980, gathering lines were centrally assessed by the Mississippi State Tax Commission; in 1980, the Mississippi Supreme Court ruled that gathering lines were not a public service company. Gathering lines that are regulated by the Federal Energy Regulatory



Ad Valorem Assessment of Oil & Gas Centrally Assessed Class IV Property Calendar Year 2009



Ad Valorem Assessment of Oil & Gas Centrally Assessed Class IV Property Calendar Year 2011

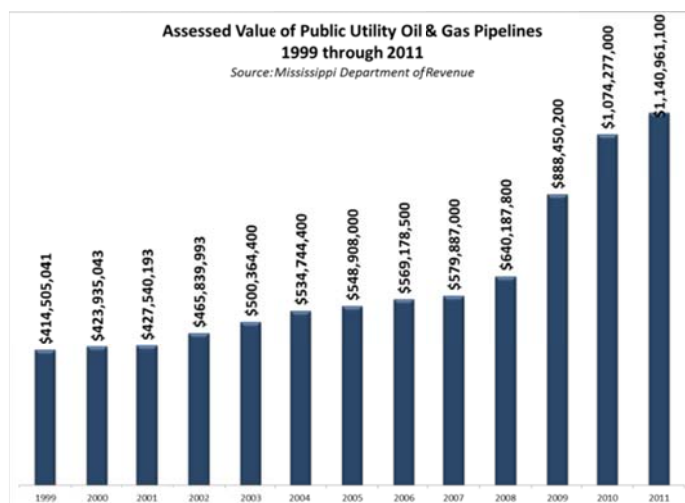


Map 6: Ad Valorem Assessed Value of Oil and Gas Class IV Centrally Assessed Public Utilities (pipelines) 2009 and 2011

Commission or by the state are centrally assessed. Following the decision by the Mississippi Supreme Court, the State Tax Commission negotiated the point of assessment with representatives of the oil and gas industry to determine that for natural gas lines, property located downstream of the pin recording meter is taxable. For oil lines, property located downstream of the holding tank is taxable.

In recent years, ad valorem tax on oil and gas pipelines has become an increasingly important source of public utility revenue in the state of Mississippi. In calendar year 2008, the total assessed value of all public utility property in the state was approximately 2.4 billion; oil and gas pipelines represented 26.21 percent of total public utility assessed values. In calendar year 2011, the assessed value of all public utility property in the state of Mississippi was \$2,483,202,698; oil and gas pipelines represented 45.95 percent of total public utility assessed values. From calendar year 2008 to 2011, the assessed value of oil and gas pipelines more than doubled from \$640,187,800 in 2008 to \$1,140,961,100 in 2011.

In fiscal year 2011, there were 35 companies operating oil or gas pipelines that were centrally assessed by the state of Mississippi; of these, five companies had pipelines with assessed value of approximately \$1 million or greater (Southeast Supply Header, Gulf South Pipeline Company, Texas Gas Transmission Corporation, Midcontinent Express Pipeline, and Southern Natural Gas Company).



lines 1999

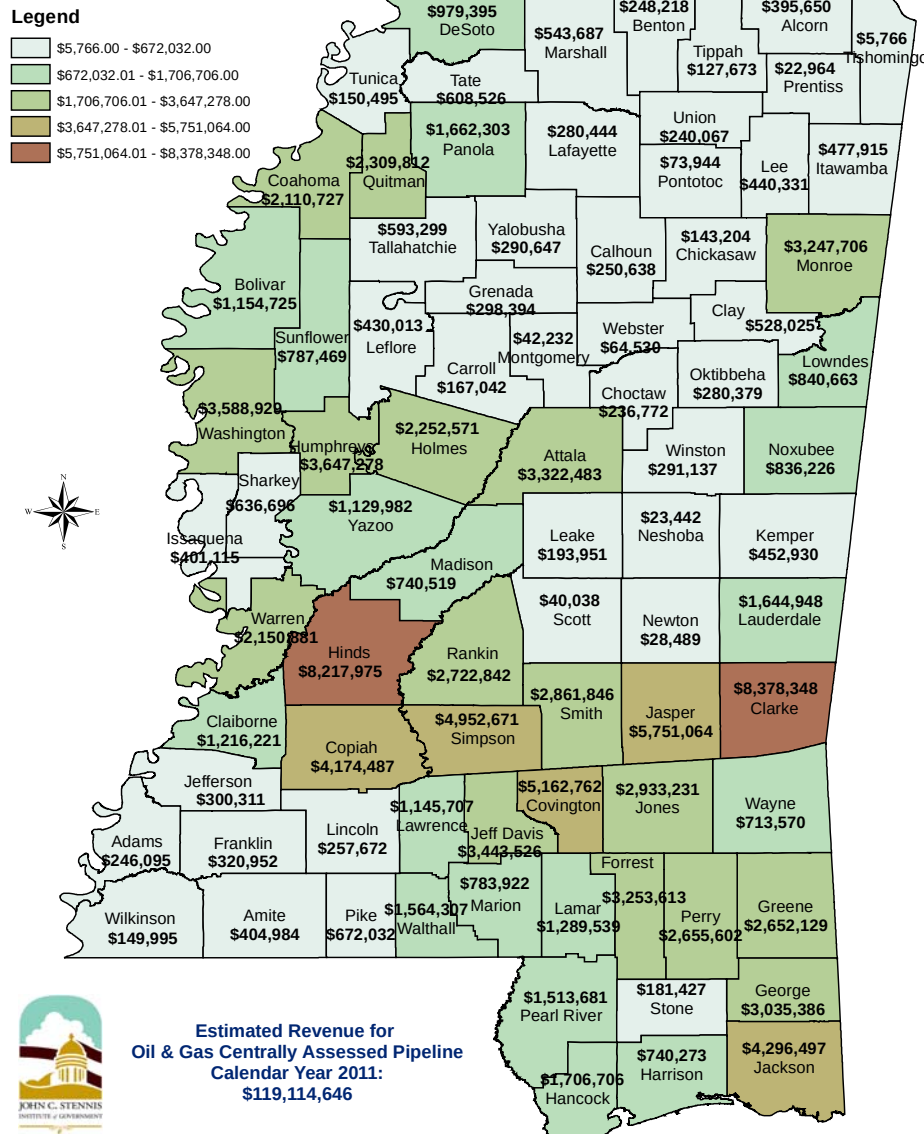
Pipeline Definitions

Flowlines: In small oil or gas fields, flowlines typically serve one wellhead. Flowlines carry the fluids or gas from the wellhead to and in-between individual vessels in separation, treating, heating, dehydrating, compression, pumping or other processing equipment generally located at or near the well site. In multiple well fields producers more commonly lay flowlines from individual wells to a central facility to perform future production processes.

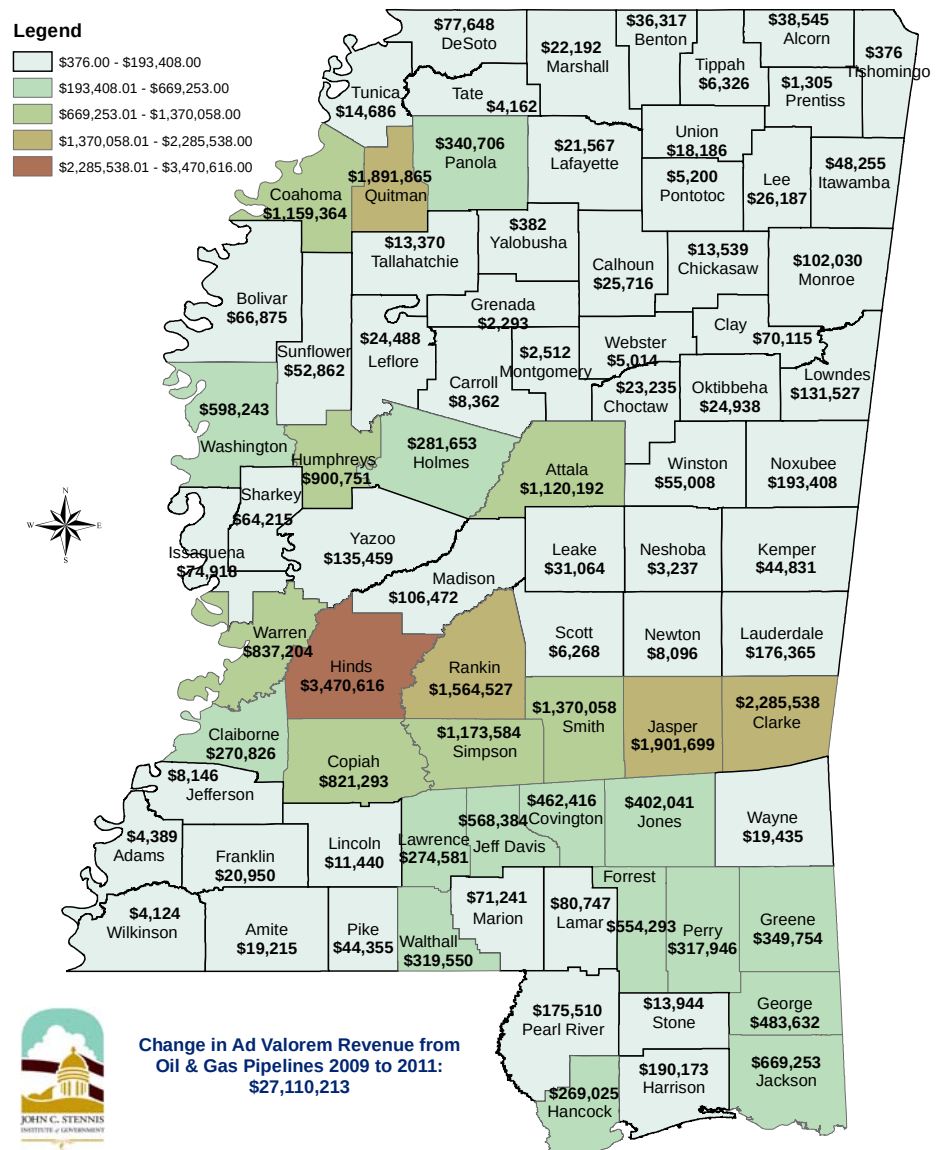
Gathering lines: Gathering lines can and do perform some of the same functions as flowlines, the principal difference being that flowlines are a network of lines tied to individual wells or equipment which move wellhead fluids or gas to the first point of accumulation of the same lines from like wells or equipment. Gathering lines are tied to the flowlines through an intermediary manifold and are the next segment of the gathering system. If separation, treating, heating, dehydrating, compression, pumping or other processing has not occurred along the flowline before the fluid or gas is gathered, then the gathering lines will transport the fluids or gasses through a processing point such as a central facility. After the oil or gas is processed through the central facility, it must be moved to a point where it can be sold and/or access a common carrier pipeline.

Common Carrier Pipeline: A pipeline operated for the purpose of transporting a product from a producer to a user, refiner, purchaser or other owner, usually for a fee or tariff.

Estimated Ad Valorem Revenue from Oil & Gas Centrally Assessed Pipeline for Calendar Year 2011



Change in Pipeline Ad Valorem Revenue from Calendar Year 2009 to 2011



Map 7: Estimated Revenue from Oil & Gas Class IV Centrally Assessed Pipeline 2011 and Change in Revenue 2009 to 2011

Every county in the state of Mississippi receives revenue from public utility, centrally assessed oil and gas pipelines. In calendar year 2009, the assessed value of public utility centrally assessed oil and gas pipelines in the state of Mississippi was \$888,450,200; in calendar year 2011, the assessed value of public utility centrally assessed oil and gas pipelines in the state was \$1,140,961,100. This represented an increase of approximately \$257.8 million in the assessed value of centrally assessed oil and gas pipelines over the two year period.

As shown in Map 6 on page 24, Hinds, Clarke, Covington, Jasper, and Simpson counties have oil and gas pipelines that had a centrally assessed value of approximately \$55 million or greater. The counties that experienced the greatest increase in the assessed value of centrally assess oil and gas pipelines were Hinds, Clarke, Jasper, Rankin, and Smith.

At the county level, tax assessors apportion the assessed value of pipelines across taxing districts within the county, and then ad valorem taxes are calculated based upon the assessed value of the pipeline within each taxing district multiplied by the millage rate within the taxing district. Within any county, taxing districts may include multiple municipalities and schools district, each with its own millage rate. To generate estimates of tax revenues associated with centrally assessed oil and gas pipelines, this report used the county millage rate as reported by the Mississippi State Department of Revenue for fiscal year 2010/2011; this method for estimating revenues to counties from ad valorem taxes on oil and gas pipelines does not include municipal millage rates and millage rates associated with municipal school districts; therefore, the information presented in the following paragraph generally underestimates actual total revenues. The estimates of county revenues associated with centrally assessed oil and gas pipelines presented in Map 7 on page 26 and in the following paragraphs were generated using millage rates for the same time period (2010/2011) and therefore reflect relative differences in revenues, but not the actual differences in revenues associated with changes in county millage rates; however, as shown in Table 7 at right, the magnitude of change in county millage rates over time would not significantly impact revenue estimates. In addition, the estimates contained in this report do not include revenues to county governments that are associated with locally assessed pipelines and gathering lines.

Table 7: County Millage Rates 2010/2011 and 2012/2013

COUNTY	2010-2011	2012-2013	Change
ADAMS	112.71	114.27	1.56
ALCORN	105.21	105.76	0.55
AMITE	73.33	74.93	1.60
ATTALA	96.09	99.76	3.67
BENTON	118.02	118.02	0.00
BOLIVAR	112.77	112.08	(0.69)
CALHOUN	112.45	114.70	2.25
CARROLL	100.00	99.92	(0.08)
CHICKASAW	130.57	130.57	0.00
CHOCTAW	79.09	79.09	0.00
CLAIBORNE	103.46	133.66	30.20
CLARKE	95.01	93.79	(1.22)
CLAY	104.34	109.57	5.23
COAHOMA	91.39	94.91	3.52
COPIAH	103.44	106.53	3.09
COVINGTON	71.50	75.62	4.12
DESOTO	101.31	98.70	(2.61)
FORREST	116.57	117.39	0.82
FRANKLIN	91.65	102.85	11.20
GEORGE	91.26	96.57	5.31
GREENE	112.44	115.56	3.12
GRENADA	102.69	100.34	(2.35)
HANCOCK	82.24	82.24	0.00
HARRISON	92.86	97.35	4.49
HINDS	109.05	111.08	2.03
HOLMES	123.39	126.24	2.85
HUMPHREYS	136.47	148.77	12.30
ISSAQUENA	113.78	119.82	6.04
ITAWAMBA	107.60	121.30	13.70
JACKSON	111.66	112.02	0.36
JASPER	96.50	94.73	(1.77)
JEFFERSON	143.65	144.61	0.96
JEFFERSON DAVIS	113.48	123.88	10.40
JONES	104.74	115.05	10.31
KEMPER	123.68	111.63	(12.05)
LAFAYETTE	111.50	102.34	(9.16)
LAMAR	119.96	119.34	(0.62)
LAUDERDALE	108.18	111.38	3.20
LAWRENCE	103.10	109.10	6.00
LEAKE	100.65	103.80	3.15
LEE	98.37	100.98	2.61
LEFLORE	101.65	103.93	2.28
LINCOLN	101.19	102.89	1.70
LOWNDES	87.27	87.77	0.50
MADISON	90.98	93.48	2.50
MARION	130.92	139.34	8.42
MARSHALL	105.87	112.61	6.74
MONROE	105.88	106.21	0.33
MONTGOMERY	125.10	124.29	(0.81)
NESHOMA	98.42	98.42	0.00
NEWTON	107.08	105.29	(1.79)
NOKUBEE	134.27	135.65	1.38
OKTIBBEHA	111.02	110.97	(0.05)
PANOLA	121.39	120.28	(1.11)
PEARL RIVER	111.75	122.36	10.61
PERRY	97.03	101.62	4.59
PIKE	98.39	104.89	6.50
PONTOTOC	117.65	118.65	1.00
PRENTISS	105.50	117.90	12.40
QUITMAN	148.23	120.22	(28.01)
RANKIN	91.84	96.59	4.75
SCOTT	106.07	106.07	0.00
SHARKEY	103.55	105.20	1.65
SIMPSON	84.45	93.50	9.05
SMITH	89.91	96.26	6.35
STONE	122.32	122.33	0.01
SUNFLOWER	111.37	124.48	13.11
TALLAHATCHIE	110.18	116.66	6.48
TATE	144.82	158.70	13.88
TIPPAH	103.05	122.07	19.02
TISHOMINGO	80.05	87.25	7.20
TUNICA	46.58	65.08	18.50
UNION	106.69	108.51	1.82
WALTHALL	103.35	106.85	3.50
WARREN	86.71	87.94	1.23
WASHINGTON	99.80	101.99	2.19
WAYNE	81.60	86.75	5.15
WEBSTER	111.26	113.68	2.42
WILKINSON	107.82	110.01	2.19
WINSTON	40.00	40.00	0.00
YALOBUSHA	130.66	130.09	(0.57)
YAZOO	113.41	114.77	1.36
Average	104.89	108.19	3.30

Table 8: 2011 Assessed Values

COUNTY	Public Service Class IV Centrally Assessed Oil & Gas Assessed Value	Total Assessed Value All Classes of Property	Class IV Oil & Gas as Percent of Total Assessed Value
JEFFERSON	\$30,344,783	\$38,593,365	78.63%
CLARKE	\$69,971,173	\$174,600,554	40.08%
JASPER	\$54,949,970	\$162,832,653	33.75%
COVINGTON	\$68,846,000	\$206,282,658	33.37%
HUMPHREYS	\$24,362,285	\$74,731,662	32.60%
QUITMAN	\$16,852,560	\$65,264,808	25.82%
PERRY	\$26,697,517	\$105,711,025	25.26%
SMITH	\$30,105,682	\$126,705,362	23.76%
GREENE	\$23,587,063	\$99,887,380	23.61%
SIMPSON	\$53,921,300	\$228,894,710	23.56%
GEORGE	\$32,243,319	\$156,131,859	20.65%
COPIAH	\$40,356,602	\$205,529,437	19.64%
ATTALA	\$32,297,878	\$187,347,689	17.24%
CLAIBORNE	\$11,755,470	\$68,618,894	17.13%
ISSAQUENA	\$3,550,315	\$21,365,392	16.62%
HOLMES	\$18,346,396	\$113,636,190	16.14%
WALTHALL	\$15,136,015	\$93,905,053	16.12%
SHARKEY	\$5,651,481	\$40,267,304	14.03%
COAHOMA	\$23,491,671	\$195,603,947	12.01%
MONROE	\$30,026,864	\$308,518,002	9.73%
NOXUBEE	\$6,247,485	\$65,004,210	9.61%
WASHINGTON	\$35,137,355	\$387,766,336	9.06%
LAWRENCE	\$11,112,578	\$124,271,562	8.94%
KEMPER	\$3,548,775	\$52,370,106	6.78%
WINSTON	\$7,272,981	\$117,597,633	6.18%
AMITE	\$5,404,836	\$94,516,398	5.72%
FRANKLIN	\$3,271,686	\$58,535,057	5.59%
JONES	\$28,004,878	\$503,059,809	5.57%
WAYNE	\$8,225,592	\$148,521,680	5.54%
YAZOO	\$9,963,689	\$180,184,249	5.53%
TALLAHATCHIE	\$5,339,266	\$102,633,373	5.20%
FORREST	\$28,021,816	\$598,725,597	4.68%
PANOLA	\$13,491,625	\$312,958,667	4.31%
HINDS	\$75,380,432	\$1,862,955,957	4.05%
WARREN	\$24,794,013	\$613,217,085	4.04%
MARION	\$5,798,670	\$143,627,196	4.04%
SUNFLOWER	\$6,911,261	\$172,135,194	4.02%
HANCOCK	\$20,752,744	\$549,041,797	3.78%
CLAY	\$5,202,727	\$138,766,938	3.75%
PEARL RIVER	\$13,263,942	\$371,178,713	3.57%
BOLIVAR	\$10,398,246	\$313,352,976	3.32%
ITAWAMBA	\$3,939,943	\$124,327,682	3.17%
BENTON	\$2,071,249	\$68,001,690	3.05%
YALOBUSHA	\$2,177,133	\$71,623,875	3.04%
CALHOUN	\$2,185,165	\$82,114,511	2.66%
LAUDERDALE	\$15,209,876	\$599,939,516	2.54%
TATE	\$4,107,778	\$167,201,266	2.46%
PIKE	\$6,830,286	\$283,343,649	2.41%
JACKSON	\$36,924,173	\$1,582,995,965	2.33%
CARROLL	\$1,671,757	\$73,119,988	2.29%
JEFFERSON DAVIS	\$2,081,733	\$92,101,608	2.26%
WILKINSON	\$1,363,471	\$60,475,772	2.25%
LAMAR	\$10,752,433	\$484,719,265	2.22%
MARSHALL	\$4,812,664	\$223,455,628	2.15%
RANKIN	\$29,647,666	\$1,439,772,130	2.06%
LEFLORE	\$4,248,301	\$235,306,750	1.81%
GRENADA	\$2,973,828	\$181,755,567	1.64%
ALCORN	\$3,741,017	\$228,848,088	1.63%
LEAKE	\$1,874,830	\$118,738,978	1.58%
STONE	\$1,483,220	\$109,901,493	1.35%
CHOCTAW	\$2,993,708	\$231,320,750	1.29%
TUNICA	\$3,087,712	\$242,046,533	1.28%
CHICKASAW	\$1,096,758	\$90,077,134	1.22%
UNION	\$2,200,430	\$205,756,808	1.07%
LOWNDES	\$9,578,023	\$907,886,499	1.05%
TIPPAH	\$1,238,940	\$117,780,469	1.05%
LINCOLN	\$2,540,895	\$265,111,533	0.96%
ADAMS	\$2,183,436	\$238,784,898	0.91%
WEBSTER	\$567,498	\$63,336,043	0.90%
OKTIBBEHA	\$2,526,617	\$330,275,356	0.77%
DESOTO	\$9,667,312	\$1,573,224,279	0.61%
MADISON	\$8,139,356	\$1,366,262,748	0.60%
LAFAYETTE	\$2,715,641	\$479,719,098	0.57%
MONTGOMERY	\$339,789	\$62,103,662	0.55%
LEE	\$4,399,789	\$815,449,838	0.54%
HARRISON	\$7,772,714	\$2,006,691,249	0.39%
PONTOTOC	\$628,510	\$170,281,386	0.37%
NEWTON	\$269,327	\$109,757,508	0.25%
SCOTT	\$377,470	\$174,464,846	0.22%
PRENTISS	\$195,890	\$129,064,764	0.15%
NESHOBA	\$238,188	\$162,145,822	0.15%
TISHOMINGO	\$67,633	\$145,402,677	0.05%

Data Source: MS Department of Revenue Annual Report 2012

For calendar year 2011, estimated revenues to county governments from public utility, centrally assessed oil and gas pipelines was \$119,114,646; this represented an increase of approximately \$27 million in revenues to Mississippi counties over the two-year period from 2009 to 2011. Although the assessed value of pipeline is the primary driver of county revenues associated with ad valorem tax revenues from pipelines, the millage rate impacts the total revenue derived from this source. For this reason, counties with higher millage rates may derive greater dollars amounts of revenues from ad valorem tax on pipelines. For example, the estimated ad valorem tax revenues to Clarke County were \$8,378,348 for calendar year 2011, as compared to \$8,217,975 in Hinds County even though the centrally assessed value of pipeline in Clarke County was lower (\$69,971,173) than that in Hinds County (\$75,380,432). These differences are attributable to the millage rates in the two counties – 109.02 in Hinds County as compared to 119.74 in Clarke County.

There is also a causal relationship between millage rates and changes in revenues associated with ad valorem taxes on centrally assessed public utility oil and gas pipelines. As revenues from this source of property tax increase, it is possible for county governments to reduce (or avoid increasing) millage rates while maintaining the revenues necessary to provide services to citizens. Although a full analysis of the impact of these revenues on millage rates is beyond the scope of this report, it is noteworthy that in Quitman County, ad valorem tax on centrally assessed oil and gas pipelines increased by an estimated \$1.9 million over the two-year period from calendar year 2009 to 2011 and that from 2010/2012 to 2012/2013, county millage rates declined by 20.01 mills. The Mississippi counties that have experienced the greatest increase in ad valorem tax revenues and an increase in estimated revenues of approximately \$1 million or greater associated with centrally assessed oil and gas pipelines include: Hinds, Clarke, Jasper, Rankin, Smith, Quitman, Coahoma, Simpson and Attala counties.

Property tax revenues are the most significant source of revenue for local governments; according to the 2010 U.S. Census of State and Local Government Finance, property taxes

represented 39 percent of local government revenue from own sources. The magnitude of importance of property tax revenues from centrally assessed oil and gas public utility pipelines varies significantly by county based upon the total assessed value of all classes of property within the county. Statewide, all species (Electric, Oil & Gas, Telephone, and Transportation) of Public Utility Class IV centrally assessed property represented slightly less than 10 percent of the total assessed value of all property classes (Personal Property, Real Property, and Public Utility Property) in calendar year 2011; oil and gas public utilities represented approximately 46 percent of the total assessed value of all Public Utility Class IV property statewide. In some Mississippi counties, the assessed value of Class IV oil and gas property represent a significant percentage of the total assessed value of all classes of property and are therefore a very important revenue source for these counties. As shown in Table 8 on page 28, which shows the total centrally assessed value of Public Utility Class IV oil and gas property in calendar year 2011 by county, there are twelve counties in Mississippi where Class IV, centrally assessed oil and gas public utility property represents between approximately 20 to 79 percent of the total assessed value of all property within the county. For example, in Jefferson County, oil and gas represents 78.63 percent of the total assessed value of all property within the county; in Humphreys County, oil and gas represents 32.6 percent of the total assessed value of all property within the county. These counties are heavily reliant upon the revenues associated with ad valorem property taxes on centrally assessed oil and gas public utility pipelines.

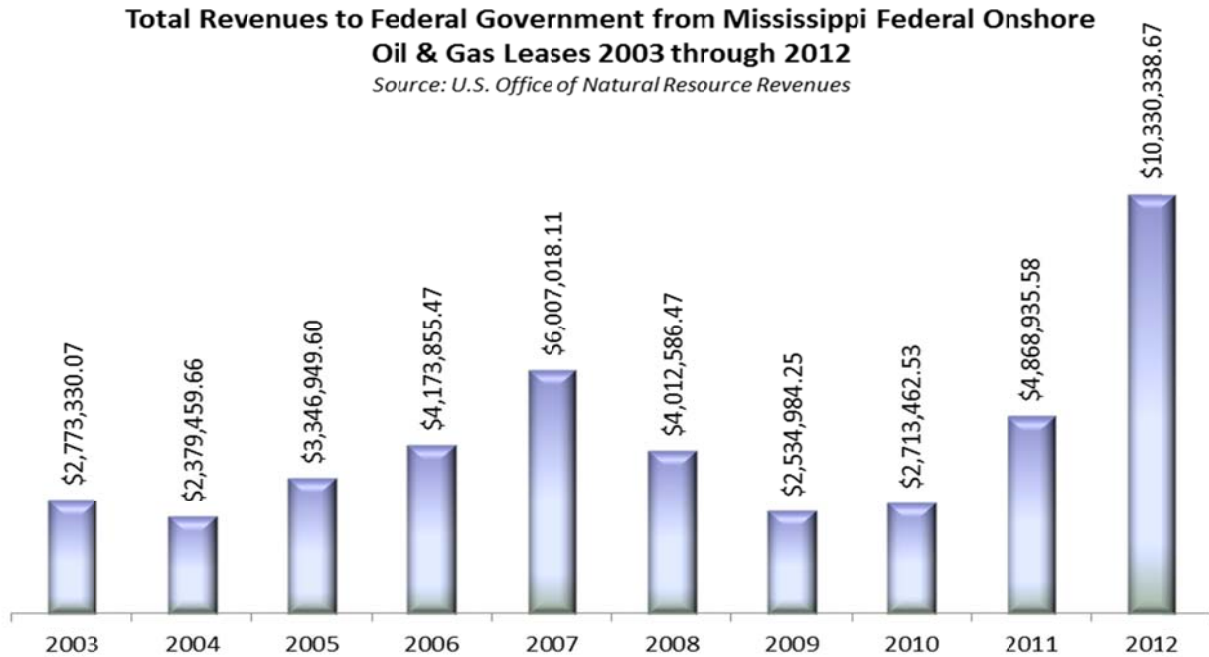


Figure 6: Total Revenues to the Federal Government from Mississippi Federal Onshore Oil & Gas Leases 2003 through 2012

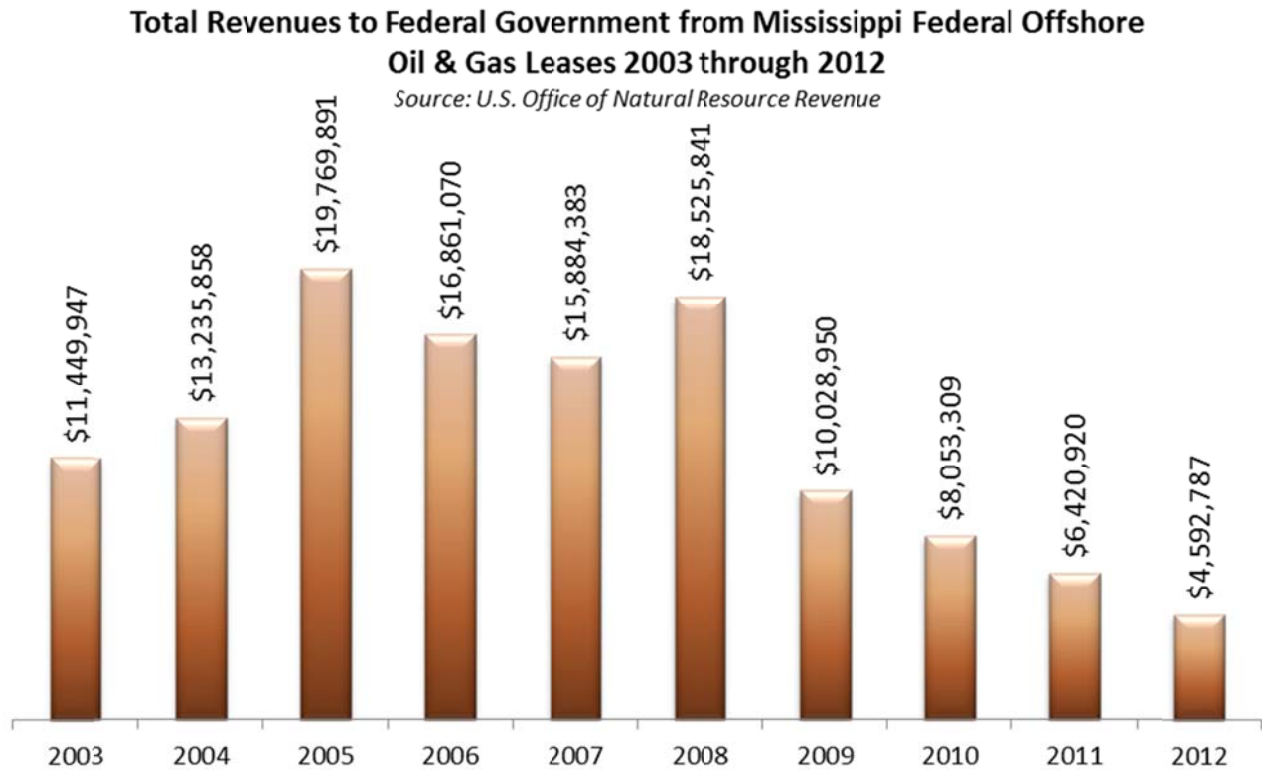


Figure 7: Total Revenues to the Federal Government from Mississippi Federal Offshore Oil & Gas Leases 2003 through 2012

Federal Onshore and Offshore Oil and Gas in Mississippi

The state of Mississippi's oil and gas industry includes both onshore and offshore oil and gas resources. In addition to receiving revenues from onshore oil and gas exploration, drilling, extraction, and production from the development of private land and state owned land, the state also receives revenues from federal lands. Development of oil and gas resources on onshore and offshore federal lands is controlled by the U.S. Department of the Interior and the Office of Natural Resource Revenue. The Office of Natural Resource Revenue verifies, collects, and disburses energy and natural resource revenues on Federal and Indian lands.

Total revenues from Mississippi Federal offshore oil and gas leases have been declining since 2008; over the period from 2008 to 2012, total revenues declined by approximately \$13.9 million (-75%). Total revenues from Mississippi Federal onshore oil and gas leases have been increasing in recent years; over the period from 2008 to 2012, total revenues increased by approximately \$6.3 million (+157%).

The state of Mississippi receives revenues from offshore oil and gas production under the 1978 Outer Continental Shelf Lands Act Amendment from the 8(g) zone; these federal leases are located in Federal waters beginning at the state's coastal boundary and ending three nautical miles seaward of the coastal boundary – this three-mile area is the 8(g) zone. The state of Mississippi receives 27 percent of revenues generated from Federal leasing of oil and gas leases in the 8(g) zone. The state of Mississippi also receives revenue from offshore oil and gas production under the Gulf of Mexico Energy Security Act (GOMESA) of 2006; Public Law 109-432 created oil and gas revenue sharing provisions for the four producing Gulf States (Alabama, Louisiana, Mississippi, and Texas); this act (GOMESA) also provided for the three gulf coast counties of Hancock, Harrison, and Jackson to receive a percentage share of these revenues. Total revenue to the three counties under GOMESA was \$1,376,559 in 2009, \$147,456 in 2010, and declined to \$16,936 in 2012.

Disbursements to the State of Mississippi from Onshore and Offshore Federal Oil & Gas Leases 2003 through 2012

Source: Office of Natural Resources Revenue

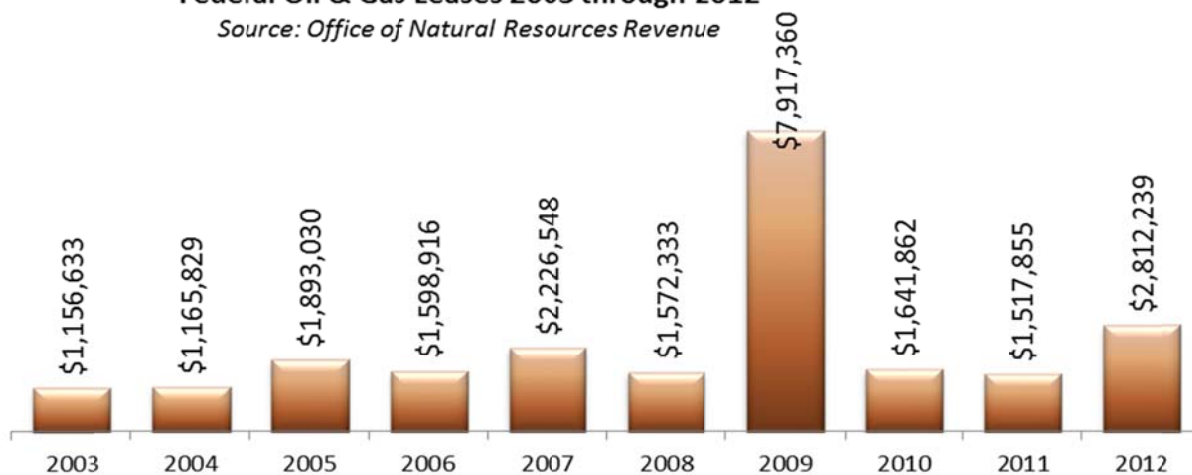


Figure 8: Revenues to the State of Mississippi from Onshore and Offshore Federal Oil & Gas Leases 2003 through 2012

Industry sectors based upon the North American Industry Classification Systems (NAICS) generally included in economic impact studies of the oil and gas industry:

NAICS	Description of Industry Segments Typically Included in Economic Impact Studies of the Oil & Gas Industry
211	Oil and Gas Extraction (including NGL Extraction). Establishments in this subsector operate and/or develop oil and gas fields. This may include exploration for oil and gas, drilling, completing and equipping wells; operating separators, emulsion breakers, desilting equipment, and field gathering lines for crude petroleum and natural gas; and all other activities in the preparation of oil and gas up to the point of shipment from the producing property. This subsector includes the production of crude petroleum, mining and extraction of oil and gas from oil shale and oil sands, the production of natural gas, sulfur recovery from natural gas, and recovery of hydrocarbon liquids. Establishments in this subsector include those that operate oil and gas wells on their own account or for others on a contract or fee basis. Establishments primarily engaged in providing support services, on a fee or contract basis, required for the drilling or operation of oil and gas wells (except geophysical surveying and mapping, mine site preparation, and construction of oil/gas pipelines) are classified in Subsector 213, Support Activities for Mining.
213111	Drilling oil and gas wells. Establishments in this subsector primarily engage in drilling oil and gas wells for others on a fee or contract basis. This industry includes contractors that specialize in spudding in a well, drilling, redrilling, and directional drilling.
213112	Support activities for oil and gas operations. This U.S. industry comprises establishments primarily engaged in performing support activities on a contract or fee basis for oil and gas operations (except site preparation and related construction activities). Services included are exploration (except geophysical surveying and mapping); excavating slush pits and cellars, well surveying; running, cutting, and pulling casings, tubes, and rods; cementing wells, shooting wells; perforating well casings; acidizing and chemically treating wells; and cleaning out, bailing, and swabbing wells.
221210	Natural gas distribution. This industry comprises: (1) establishments primarily engaged in operating gas distribution systems (e.g., mains, meters); (2) establishments known as gas marketers that buy gas from the well and sell it to a distribution system; (3) establishments known as gas brokers or agents that arrange the sale of gas over gas distribution systems operated by others; and (4) establishments primarily engaged in transmitting and distributing gas to final consumers.
237120	Oil and gas pipeline and related structures construction. This industry comprises establishments primarily engaged in the construction of oil and gas lines, mains, refineries, and storage tanks. The work performed may include new work, reconstruction, rehabilitation, and repairs. Specialty trade contractors are included in this group if they are engaged in activities primarily related to oil and gas pipeline and related structures construction. All structures (including buildings) that are integral parts of oil and gas networks (e.g., storage tanks, pumping stations, and refineries) are included in this industry.
238910	Site preparation and related construction activities on a contract or fee basis. This industry comprises establishments primarily engaged in site preparation activities, such as excavating and grading, demolition of buildings and other structures, and septic system installation. Earth moving and land clearing for all types of sites (e.g., building, nonbuilding, mining) is included in this industry. Establishments primarily engaged in construction equipment rental with operator (except cranes) are also included.
324110	Petroleum Refineries. This industry comprises establishments primarily engaged in refining crude petroleum into refined petroleum. Petroleum refining involves one or more of the following activities: (1) fractionation; (2) straight distillation of crude oil; and (3) cracking.
324191	Petroleum lubricating oil and grease manufacturing. This industry comprises establishments primarily engaged in blending or compounding refined petroleum to make lubricating oils and greases and/or re-refining used petroleum lubricating oils.
32412	Asphalt paving, roofing, and saturated materials manufacturing. This industry comprises establishments primarily engaged in (1) manufacturing asphalt and tar paving mixtures and blocks and roofing cements and coatings from purchased asphaltic materials and/or (2) saturating purchased mats and felts with asphalt or tar from purchased asphaltic materials.
325110	Petrochemical Manufacturing. This industry comprises establishments primarily engaged in (1) manufacturing acyclic (i.e., aliphatic) hydrocarbons such as ethylene, propylene, and butylene made from refined petroleum or liquid hydrocarbons and/or (2) manufacturing cyclic aromatic hydrocarbons such as benzene, toluene, styrene, xylene, ethyl benzene, and cumene made from refined petroleum or liquid hydrocarbons. (Note: some industry researchers do not include petrochemical manufacturing as an element of the oil and gas industry)
4247	Petroleum and petroleum products merchant wholesalers. This industry comprises establishments with bulk liquid storage facilities primarily engaged in the merchant wholesale distribution of crude petroleum and petroleum products, including liquefied petroleum gas.
486	Pipeline Transportation. Industries in the Pipeline Transportation subsector use transmission pipelines to transport products, such as crude oil, natural gas, refined petroleum products, and slurry. Industries are identified based on the products transported (i.e., pipeline transportation of crude oil, natural gas, refined petroleum products, and other products). The Pipeline Transportation of Natural Gas industry includes the storage of natural gas because the storage is usually done by the pipeline establishment and because a pipeline is inherently a network in which all the nodes are interdependent.
44711	Gasoline stations with convenience stores. This industry comprises establishments engaged in retailing automotive fuels (e.g., diesel fuel, gasohol, gasoline) in combination with convenience store or food mart items. These establishments can either be in a convenience store (i.e., food mart) setting or a gasoline station setting. These establishments may also provide automotive repair services.
44719	Other gasoline stations. This industry comprises establishments known as gasoline stations (except those with convenience stores) primarily engaged in one of the following: (1) retailing automotive fuels (e.g., diesel fuel, gasohol, gasoline, alternative fuels) or (2) retailing these fuels in combination with activities, such as providing repair services; selling automotive oils, replacement parts, and accessories; and/or providing food services.
45431	Fuel dealers. This industry comprises establishments primarily engaged in retailing heating oil, liquefied petroleum (LP) gas, and other fuels via direct selling.
493190	Other Warehouse and Storage. This industry comprises establishments primarily engaged in operating warehousing and storage facilities (except general merchandise, refrigerated, and farm product warehousing and storage). This industry includes establishments primarily engaged in bulk storage of petroleum, lumber storage terminals, whiskey warehouses.
541360	Geophysical Surveying and Mapping Services. This industry comprises establishments primarily engaged in gathering, interpreting, and mapping geophysical data. Establishments in this industry often specialize in locating and measuring the extent of subsurface resources, such as oil, gas, and minerals, but they may also conduct surveys for engineering purposes. Establishments in this industry use a variety of surveying techniques depending on the purpose of the survey, including magnetic surveys, gravity surveys, seismic surveys, or electrical and electromagnetic surveys. Establishments primarily engaged in taking core samples, drilling test wells, or other mine development activities (except geophysical surveying and mapping) on a contract basis for others are classified in Industry 21311, Support Activities for Mining.

Source: U.S. Census Bureau, Department of Commerce North American Industry Classification System

The Economic Impact of the Oil and Gas Industry

Over the last five years, the oil and gas industry in the U.S. has grown significantly, with increased domestic production driven largely by increased oil and gas production from shale formations across the country. Oil and gas production is transforming the oil and gas industry and the U.S. economy. Prior to 2008, the U.S. was a net importer of diesel and gasoline; in February 2012, the U.S. Energy Department reported that for the first time since 1949, the U.S. exported more gasoline, heating oil, and diesel fuel than it imported.

Growth in natural gas production between 2009 and 2011 led to record low prices in late 2012, with the price rebounding in early 2013. The price of West Texas Intermediate (WTI) Crude is representative of the price that U.S. oil producers receive for output, and the price of Brent Crude is representative of the international price of crude – the price spread between WTI and Brent impacts the U.S. oil and gas industry. Historically, WTI and Brent traded in-line with each other; however, with significant increases in U.S. production, these prices have tended to decouple and the spread between WTI and Brent increased with WTI trading at a lower price than Brent. Higher Brent prices favor international oil producers and higher WTI prices favor U.S. oil producers. During the 1st Quarter of 2013, the average price per barrel for WTI was \$94.36 and \$112.64 for Brent. An important contributory factor to the imbalance between U.S. production, U.S. supply, and the price for U.S. produced oil is the U.S. regulatory restrictions (e.g. Mineral Leasing Act of 1920, Energy Policy and Conservation Act of 1975, Export Administration Act of 1979) on exporting crude oil to other countries that negatively impact the efficiency of the oil economy. Crude oil prices and gas prices are the major driver of energy investments in new production; oil and gas prices affect the revenues and return on investment of producers and affect investments in the development of new hydrocarbon resources. For example, low gas prices compared to higher oil prices have incentivized the industry to move away from gas drilling towards oil drilling as demonstrated in Mississippi's experience with declining gas severance tax revenues in recent years and an increase in permits to drill for oil (see Table 2 page 13). Although increased supply and lower prices may negatively impact drilling activities, lower prices enhance the competitiveness of U.S. refiners and increase the competitiveness of U.S. refined petroleum products and gas exports; increased exports present an opportunity to offset the dampening effect that increased U.S. production coupled with declining U.S. demand and economic recession has had on domestic prices. Maximizing this potential competitive advantage will require increased refinery capacity and transportation infrastructure.

The boom in U.S. shale energy production has significantly impacted the U.S. economy. Increased production requires new infrastructure to transport this production to refineries and to markets. This has led to significant investment in transportation infrastructure to include pipelines, terminals, tankers, processing plants, and refinery expansions. For example, the U.S. oil tanker industry has seen a significant increase in demand as vessels that traditionally carried refined products (gasoline) from refineries to areas not linked with pipelines. These tankers are now carrying crude oil from ports in the Houston and Corpus Christi area to refineries on the Gulf Coast resulting in increased orders for the production of tankers. Increased production has resulted in increased barge traffic on inland and coastal waterways and stimulated the development of new terminal facilities; capacity utilization rates

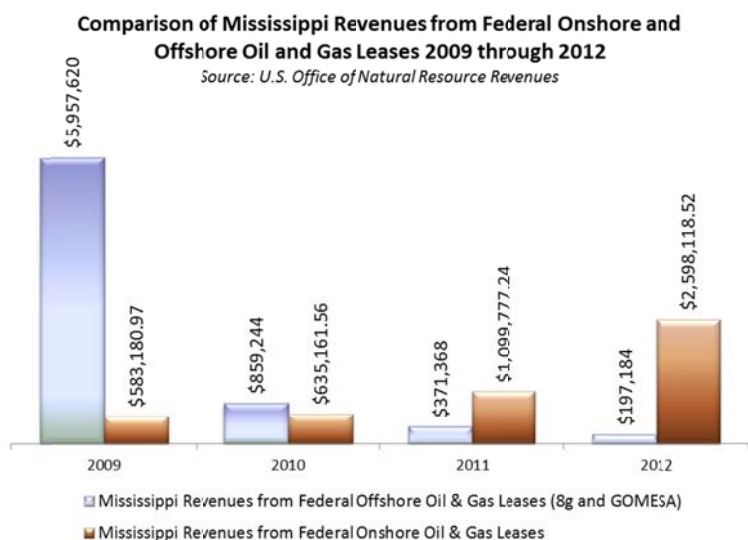
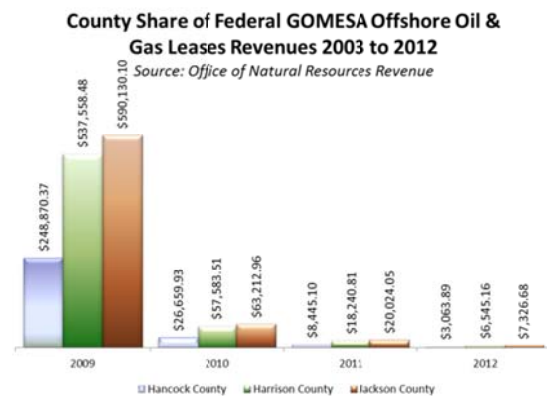
for inland tank barges was approximately 90 to 95 percent in 2012 and 80 to 85 percent for coastal tank barges. Increased production of U.S. crude oil, combined with delays in pipeline construction, has generated increased use of railroads and a surge in demand for rail tank cars. In many areas of the U.S., refineries that had been scheduled to be shut down have remained open, and other existing U.S. refineries are expanding their plants to process lighter grades of shale crude oil and to increase the production of diesel fuel for export.

Major refineries in the state of Mississippi include:

- *Chevron* operates a refinery and crude oil storage facilities in Pascagoula. This facility has the capacity to store 16 million gallons of crude oil. The Pascagoula Refinery processes 330,000 barrels (13.9 million gallons of crude oil/day). Products include gasoline, jet fuel, and diesel, and it manufactures chemicals used as feedstock in the textile and plastics industry. Chevron employs approximately 1,490 people at its Mississippi facility with an annual payroll of \$330 million; it pays approximately \$39.8 million in county property tax and school tax annually. The Chevron facility in Mississippi has the 10th largest oil refining capacity in the U.S.
- *Hunt Southland Refining Company* operates an asphalt refinery in Sandersville, Mississippi with the capacity to process 10,000 barrel per day; it processes crude oil primarily from Mississippi oil fields. It operates the Hunt Southland Terminal in Lumberton with a storage capacity of 357,000 barrels and the Hunt Southland Terminal in Vicksburg with a storage capacity of 387,000 barrels
- *Ergon Refining, Inc.* operates a refinery in Vicksburg, Mississippi with a processing capacity of up to 25,000 barrels of crude oil per day; it produces specialty petroleum products. Naphthenic base and process oils produced at Vicksburg are used by Ergon's global customers in electrical transformer oils, compound blending operations, rubber products, chemical processing, printing inks, metalworking fluids, refrigeration oils, paints and greases. In September 2012, Ergon announced a \$147 million expansion of its Vicksburg refinery.
- The Gulf LNG Terminal in Pascagoula is a \$1.1 billion liquid natural gas import/export terminal (connected to the Mobile Bay lateral) co-owned by GE Energy Financial services and El Paso, Crest Group and Sonangol. In 2012, the terminal paid \$2.16 million in taxes to Jackson County and \$5.6 million in school taxes.

On February 22, 2007, the U.S. Department of Energy announced the selection of Richton, Mississippi as the site for a Strategic Petroleum Reserve with the capacity to store up to 160 million barrels to include an oil terminal at Liberty, MS for distribution into the Capline Pipeline System and approximately 330 miles of pipelines for water supplies, brine disposal to the Gulf, and oil distribution. The proposed \$4 billion project would have had economic impact in three areas of the state of Mississippi to include: 1) a storage facility in Richton, with an estimated impact in Forrest, Lamar, and Perry counties of 3,805 jobs and \$100,1264,943 in household earnings annually during construction and 443 jobs and \$14,277,618 during ongoing operations; 2) a marine terminal in Pascagoula, with an estimated impact on George and Jackson counties of 233 jobs and \$6,519,281 during construction and 78 jobs and \$2,638,399 in household earnings annually during ongoing operations; and 3) a pipeline terminal near Liberty, with an impact in Amite and Pike counties of 196 jobs and \$4,497,617 during construction and 84 jobs and \$2,932,877 in household earnings annually during ongoing operations. In April 2011, Congress rescinded funding for the U.S. DOE Strategic Petroleum Reserve in Richton, Mississippi.

Multiple studies have been conducted on the economic impact of the oil and gas industry in Mississippi. For example, a study conducted by Price Waterhouse Coopers for the American Petroleum Institute estimated that the total operational impact of the oil and natural gas industry in the state of Mississippi created a total of 83,758 jobs (32,430 direct and 51,328 indirect and induced) with a total labor income of approximately \$3,609,000,000. It is beyond the scope of this report to conduct a comprehensive economic impact analysis of the entire oil and gas industry on the state of Mississippi; rather, it focuses more directly on the investments in drilling activities, the production of oil and gas, and related development of the associated pipeline infrastructure that generate measurable tax revenues to the state and to county governments in the state of Mississippi. Even with this limited focus, data related to a wide range of tax revenues associated with the business activities of oil and gas exploration and production companies operating in the state of Mississippi is not readily accessible. For example, the Mississippi Department of Revenue aggregates a large number of industry sectors into a few categories when reporting corporate income and franchise tax revenues, as a result this information is difficult and time consuming to extrapolate for purposes of analysis. In addition, the oil and gas industry in Mississippi experienced a significant disruption with the advent of the explosion of the Deepwater Horizon on April 20, 2010 and a subsequent moratorium on offshore drilling and the issuance of new permits significantly impacted economic activity associated with *offshore* activities, but did not impact *onshore* oil and gas activities in the state of Mississippi. Disaggregating the economic impact of onshore oil and gas activities from offshore oil and gas activities in the state of Mississippi is problematic, although there is evidence that onshore oil and gas drilling and production have mitigated the negative economic impact of the events related to the Deepwater Horizon. As shown in Figure 8 on page 31, revenues to the state of Mississippi from Federal offshore oil and gas leases declined by over \$5 million in the period immediately following the explosion of the Deepwater Horizon and have continued to decline every year through 2012; over the same period revenues to the state of Mississippi from Federal onshore leases have steadily increased over the period from 2009 through 2012, reaching \$2.6 million in 2012.

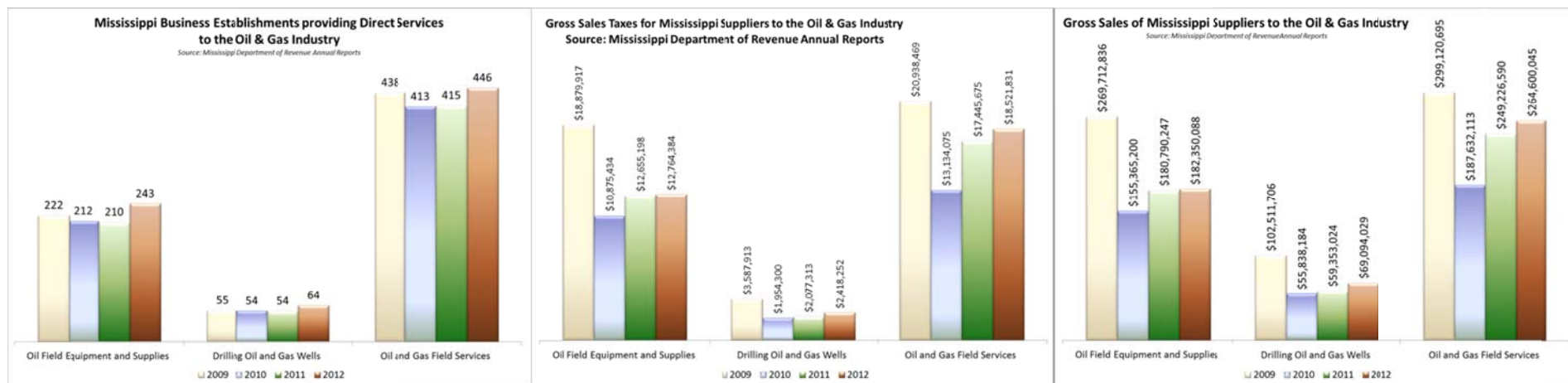


Gas

Table 9: Economic Indicators of Selected Segments of the Mississippi Oil and Gas Industry 2008 and 2011

Industry Code NAICS	Description	EMPLOYMENT			EMPLOYEE COMPENSATION			TAX ON PRODUCTION AND IMPORTS		
		2008	2011	Change 2008 to 2011	2008	2011	Change 2008 to 2011	2008	2011	Change 2008 to 2011
20	Extraction of oil and natural gas	3,753	7,277	3,523	\$102,445,944	\$119,432,617	16,986,673	\$158,487,920	\$113,111,351	-45,376,569
28	Drilling oil and gas wells	1,405	1,233	-172	\$128,301,680	\$97,190,994	-31,110,686	\$12,119,845	\$13,517,552	1,397,707
29	Support activities for oil and gas operations	2,877	3,479	602	\$176,173,120	\$217,667,297	41,494,177	\$9,459,140	\$11,093,766	1,634,626
32	Natural gas distribution	573	625	52	\$36,337,956	\$44,988,796	8,650,840	\$12,821,239	\$22,303,791	9,482,552
115	Petroleum refineries	1,851	1,921	70	\$305,202,368	\$355,867,462	50,665,094	\$28,985,924	\$67,467,606	38,481,682
116	Asphalt paving mixture and block manufacturing	148	174	26	\$13,321,319	\$16,526,569	3,205,250	\$220,153	\$514,608	294,455
117	Asphalt shingle and coating materials manufacturing	166	206	41	\$14,096,260	\$21,726,748	7,630,488	\$190,644	\$586,762	396,118
118	Petroleum lubricating oil and grease manufacturing	78	58	-19	\$7,107,098	\$7,606,172	499,074	\$242,288	\$410,132	167,844
119	All other petroleum and coal products manufacturing	37	26	-11	\$3,485,477	\$3,342,359	-143,118	\$86,948	\$150,412	63,464
206	Mining and oil and gas field machinery manufacturing	75	101	26	\$4,772,023	\$6,271,382	1,499,359	\$247,478	\$451,133	203,655
337	Transport by pipeline	930	981	51	\$83,354,976	\$88,937,256	5,582,280	\$29,137,712	\$19,184,217	-9,953,495
TOTAL		11,893	16,081	4,188	\$874,598,221	\$979,557,653	104,959,432	\$251,999,291	\$248,791,331	-3,207,960
326	Retail Stores - Gasoline stations	16,757	15,472	-1,285	\$286,708,448	\$282,545,074	-4,163,374	\$181,265,792	\$171,668,289	-9,597,503

Source: IMPLAN 2007 and 2011, most recent available comparable data



ry

Although the most recent report on the number of drilling rigs in the Gulf of Mexico (Baker Hughes, July 2013) indicates that the number of rigs (57) has reached its highest level since 2009, the long term impact of Federal policies on offshore oil and gas leasing and the effect on revenues to the state of Mississippi from offshore Federal oil and gas leases is as yet unknown.³

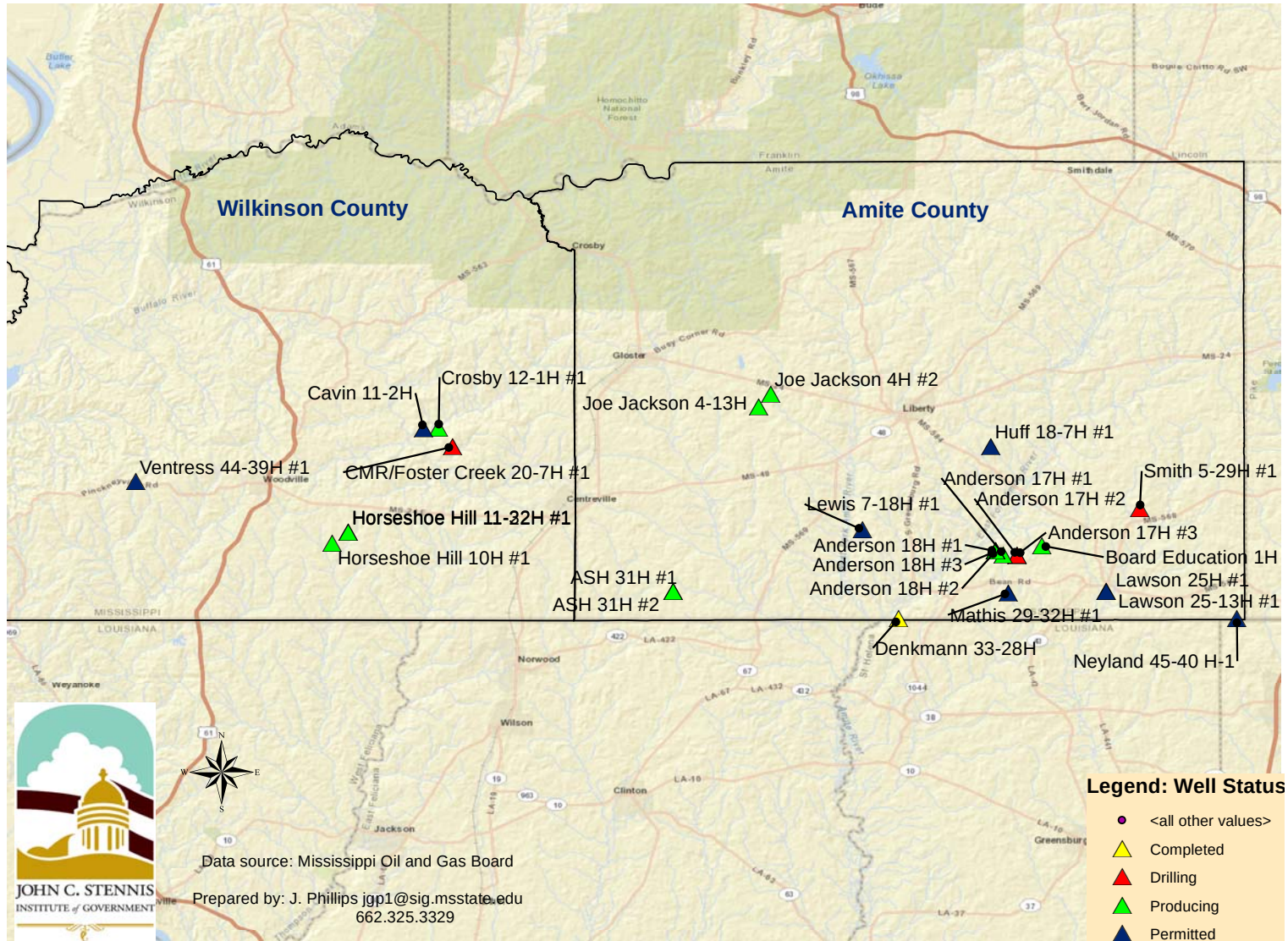
Employment and employee compensation in selected subsectors of the Mississippi oil and gas industry have exhibited resilience within the context of the impact of the events related to the explosion of the Deepwater Horizon and the recession, which began in December 2007, and technically ended in June 2009. Table 9 provides the most recent reliable and comparable data for employment and employee compensation by industry NAICS code for subsectors of the economy that are normally associated with economic impact analysis of the oil and gas industry.⁴ As shown, employment in the Mississippi oil and gas sector has increased by approximately 65 percent with the exception of employment at gasoline stations. With an increase of 3,523 jobs, the largest increase in the industry has been related to activities related to the extraction of oil and natural gas, followed by an increase of 602 jobs in support activities for oil and gas operations. Due to the decline experienced in offshore oil and gas activities, a significant amount of this employment increase is associated with onshore oil and gas activity. The three subsectors directly associated with the exploration, drilling, and production of oil and gas (Extraction of oil and natural gas – NAICS Code 20; Drilling oil and gas wells – NAICS Code 28; and Support activities for oil and gas operations – NAICS Code 29) contributed approximately \$434,290,909 of employee compensation to Mississippi's economy in 2011.

The Mississippi Department of Revenue's Annual Report provides data on business establishments that pay sales tax; although disaggregated data is not available for all industry subsectors related to the drilling and production of oil and gas, information associated with a few subsectors could be identified from these reports. These establishments include 1) businesses providing oil field equipment and supplies; 2) businesses that drill oil and gas wells; and 3) businesses that provide oil and gas field services. In 2012 there were 243 business establishments that provide oil field equipment and supplies, 64 business establishments that drill oil and gas wells, and 446 businesses that provide oil and gas field services in the state of Mississippi that pay sales tax on sales – a total of 753 – representing an increase of 38 business since 2009 (Figure 9). In 2012, business establishments in these three subsectors generated gross sales of approximately \$516 million and paid approximately \$33.7 million in sales taxes. As shown in Figure 9, these businesses have been slowly recovering since the advent of the Deepwater Horizon, but gross sales in these three subsectors were still \$155.3 million lower in 2012 than they were in 2009. Given that there is little indication of Mississippi having recovered from the impact of the moratorium on Federal oil and gas leasing subsequent to the explosion of the Deepwater Horizon based upon revenues from Federal offshore oil and gas leases, it is likely that the positive economic impacts of the oil and gas industry on Mississippi employment and income is related to new onshore drilling and production related to shale oil and gas resources.

³ Authors Note: as of July 2013, there were 11 rigs active in Mississippi; 8 were drilling for oil and 3 were drilling for gas. There were two rigs drilling for oil in Amite County; three rigs drilling for oil in Adams County; and three counties (Smith, Jasper, and Perry) each had one rig drilling for oil.

⁴ Not included are: NAICS code 36 – Construction associated activities; NAICS code 319 – Wholesale trade activities; and NAICS code 335 – Transport by truck

Permitting, Drilling, and Producing Activity in the Tuscaloosa Marine Shale as of July 2013



Map 8: Oil Development of the Tuscaloosa Marine Shale in Southwest Mississippi

Technological developments including horizontal drilling and hydraulic fracturing have enhanced the ability of producers to recover oil and natural gas from shale formations. During the late 1980s and early 1990s, deep shale gas production from the Barnett Shale in North Central Texas became commercially viable and, with these initial successes, producers expanded activities to the Haynesville, Marcellus, Woodford, Fayetteville, and Eagle Ford shale formations. More recently, development has begun to focus on the Tuscaloosa Marine Shale formation in Southeast Mississippi. Beginning in late 2010 and 2011, the oil and gas industry exhibited an increased interest in the exploration and development of the Tuscaloosa Marine Shale in southwest Mississippi.

Exploration, development, and related production from the Tuscaloosa Marine Shale (TMS) are at a very early stage. Historically, there have been multiple attempts to penetrate and extract hydrocarbon resources from the TMS; until 2010, few had been commercially viable. On September 29, 1971, Sun Oil was permitted to drill the W. P. Spinks #1 well in Section 7, Township 2 North, Range 7 East in Pike County to a proposed depth of 11,300 feet. Alfred C. Moore, a former geophysical engineer for Sun Oil, was the champion of this project. On December 9, 1972, there was notice of intention to plug and abandon the W. P. Spinks #1 and it was subsequently plugged. On April 5, 1985, the Amerada Hess Corporation was permitted to drill the Montrose Plantation #1 well; the proposed depth was 13,200 feet. The Montrose Plantation was a wildcat well on an 80 acre drilling unit located in Section 13 of Wilkinson County. The well was completed on May 23, 1985; the dry hole was plugged and abandoned in June of 1985.

In 1998, Worldwide Companies drilled the Braswell 24-12 #1 well in the South Magnolia Field in Pike County. The well was spudded on June 11, 1998 and the date of first production is listed as September 28, 1998 on the well completion report, with a calculated rate of production of 102 barrels of oil and 50 Mcf of gas over a 24 hour period. On April 29, 2011, a change of operator permit for the Braswell 24-12 #1 was submitted by Sanchez Oil and Gas Corporation for the 320 acre drilling unit located in Section 24. From the records, it appears that the Braswell 24-12 #1 was the first horizontal well drilled in the Tuscaloosa Marine Shale. The well has been continuously producing since October 1998, with the exception of fairly extended periods when the well has been closed in. From October 1998 through February 2013, total production from the well has been 14,750 barrels of oil and 555 Mcf of gas.

In 2007, Encore Operating, L.P. began aggressive testing for production in the undefined oil-producing interval of the Tuscaloosa Marine Shale. On February 22, 2007, Encore was permitted to horizontally drill and complete the Joe Jackson 4-13H well on a 640 acre drilling unit located in the West Enterprise field in Amite County. This well was permitted to a measured depth of approximately 15,650 feet; a well completion report was filed on August 17, 2007. On January 19, 2011, a change of operator permit for the Joe Jackson 4-13H was submitted and approved for Denbury Onshore, LLC. On January 19, 2012, a Change of Operator application for the Joe Jackson 4-13H #1 well was filed by Encana Oil & Gas (USA) and an application to drill was approved on January 25, 2012. According to the Mississippi Oil & Gas Board's Well Production database, the Joe Jackson 4-13H well has been continuously producing since December 2007, with total production of 36,139 barrels of oil through December 2012.

The Board of Education #1H was a wildcat well targeting the Tuscaloosa Marine Shale that was permitted by Encore Operating on April 25, 2008 for a 640 acre drilling unit with a proposed depth of 17,500 feet located in section 16 of Amite County. The well was spudded on August 20, 2008, and a well completion report was submitted on January 26, 2009. Design reports from Haliburton dated December 15, 2008 indicate a measured depth of 14,946 – 16,500 feet and a vertical depth of 11,985.85 – 11,992.45 feet. A Change of Operator permit was submitted by Denbury Onshore, LLC on January 19, 2011, effective January 1, 2011, and another Change of Operator permit for Encana Oil and Gas (USA), Inc. was submitted on April 29, 2011 to be effective May 1, 2011. On June 15, 2011, a well recompletion report was submitted by Encana Oil & Gas; oil produced during the test was 373 barrels of oil and 117 Mcf of gas; oil gravity was 37.7 API. Encana was issued a permit to transport oil from the site on June 20, 2011. In 2012, production from the Board of Education #1H well was 24,194 barrels of oil and 9,900 thousand cubic feet of gas.

Although there has long been interest in the Tuscaloosa Marine Shale in Mississippi, it is only recently that the confluence of horizontal drilling, hydraulic fracturing, and high oil and gas prices have changed the field level economics that are driving the current interest in the exploration and development of the hydrocarbon resources of the Tuscaloosa Marine Shale. Exploration of the TMS is in a relatively early stage. Production levels and the long-term productivity of wells are not yet tested and are uncertain. Shale presents multiple drilling challenges to include the deep vertical depths of the wells, the need to drill long laterals, the variability of the shale rock quality, and the undulating character of shale zones. As shown in Map 5, outlining the areas of high resistivity (usually attributed to the presence of oil), TMS wells are deep. Experience in Mississippi has seen TVD ranging between 12,000 and 13,000 feet and lateral lengths between 4,500 and 7,000 feet, depending upon the geographic location of the well. The development of hydrocarbon resources in shale is complex; identifying well locations, mapping, stimulation methods, optimizing drilling strategies, and enhancing completion rates remain challenging. Experience in other shale plays (e.g. the Haynesville, Marcellus, or Eagle Ford) is not fully transferable to the Tuscaloosa Marine Shale. Drilling problems associated with the development of shale hydrocarbons include high pressure and high temperature, sloughing, cave-ins, and wellbore strength. These wells are expensive to drill; estimates reported by companies operating in the TMS range from \$15 million to \$21 million per well. Industry technological advances in reservoir evaluation, accuracy and quality of drilling, and production management have enabled the optimization of ultimate recovery and production. However, the industry has not yet “cracked the code” of the Tuscaloosa Marine Shale. Industry growth, production estimates, and related revenues will be subject to change over time as new wells go into production and producers adapt drilling technology to the unique characteristics of the Tuscaloosa Marine Shale.

Multiple factors will impact the rate of development of the hydrocarbon resources of the Tuscaloosa Marine Shale in the state of Mississippi. Field level economics specific to the Tuscaloosa Marine Shale will be one element that drives future development in Mississippi. For many firms, investments made to develop the TMS represent an opportunity cost for strategic capital investment in other shale plays.

The oil produced in southwest Mississippi from the TMS has been primarily Louisiana Light Sweet crude, which sells at a premium as compared to West Texas Intermediate. This price premium enhances the

revenue projections and return on investment for developers of the Tuscaloosa Marine Shale, but does not compensate for the high costs of drilling wells, particularly when ultimate recovery and production decline curves are not yet fully quantifiable.

The oil and gas industry is capital intensive. The ability to access short- and long-term capital and equity or to obtain bank financing and credit is essential to the industry. Access to credit and liquidity are key factors, particularly for companies that are exploring and developing the Tuscaloosa Marine Shale where early development drilling costs have been higher than anticipated and unanticipated delays have impacted cash flow from operations. Small firms with inadequate access to credit may be unable to successfully complete wells and bring production on line. Financial downturns or negative credit market conditions will adversely impact exploration, development, and production.

Permit activity associated with the Tuscaloosa Marine Shale has been steadily increasing in 2012 and early 2013; Encana and Goodrich are the main developers. As of July 2013, the database of the Mississippi Oil and Gas Board contained 19 permitted wells with Encana listed as the operator and seven permitted wells with Goodrich listed as the operator. There are 21,816 acres associated with these drilling units that are located in either Amite or Wilkinson County; the average drilling unit contains approximately 1,100 acres. Currently, the two major industry players that have begun active development of the Tuscaloosa Marine Shale are Encana Oil & Gas (USA), Inc. and Goodrich Petroleum Corporation.

- *Encana Oil & Gas (USA), Inc.* is an exploration and production subsidiary of Encana Corporation. Encana Corporation is a Canadian based company; in the year ending December 31, 2011, the company reported operating earnings of \$398 million, net earnings of \$128 million, and cash flow of \$4,175 million. In 2011, Encana Corporation reported average natural gas production of 3,333 MMcf per day and oil and NGL production of 24.0 thousand barrels per day. The company engages in joint venture funding with other investors and recently (November 6, 2012) announced a \$542 million joint venture with Nucor Corporation to provide natural gas for its U.S. steel production facilities. (Encana's average working interest in the Tuscaloosa Marine Shale is 75 percent). The company is transitioning from its focus on gas and accelerating its development of oil production. In 2011, Encana USA made land and property acquisitions of \$105 million. The company drilled 402 net wells in 2011 throughout the U.S. Encana's original 2012 plan to drill between 40 and 45 wells has been expanded to drill between 115 and 120 wells in 10 U.S. plays primarily focused on oil.

During Encana's June 21, 2012 Investor Day presentation, Jeff Wojahn, Executive Vice-President and President of Encana's USA Division, described its TMS assets as "a promising liquids-rich opportunity." Encana has established an industry leading land position in the Tuscaloosa Marine Shale totaling approximately 355,000 net acres; over 50 percent of their land position is located within the state of Mississippi. Management statements indicate that the Tuscaloosa Marine Shale plays a prominent role in their strategy to shift from gas to liquid production and is anticipated to contain among the highest producing oil wells in the company's portfolio.

The company estimates 9.4 billion barrels of crude oil in place in the TMS, and statements indicate that the majority of its acreage in the TMS is positioned in acreage that will yield

approximately 20 million barrels of oil per section. In Encana's Third Quarter report (October 24, 2012), the company indicated that it had four operated producing wells in the Tuscaloosa Marine Shale and was awaiting completions on two wells; it also announced that it planned to drill a total of 12 wells in the TMS in 2012. The company is operating two drilling rigs in Mississippi and focusing on reducing drilling costs. The company stated that it is targeting a cost of \$12.8 million per well with an estimated ultimate recovery of 730,000 barrels of oil equivalent per well and estimated severance taxes of approximately \$3.5 million per well. The company indicates that it has 1,250 net well locations (approximately 2,500 wells) in the TMS (this includes Mississippi and Louisiana positions), with approximately 100 currently planned well locations in Amite and Wilkinson County.

- *Goodrich Petroleum Corporation* is an independent oil and natural gas company that engages in the exploration, development, and production of oil and natural gas. Goodrich Petroleum Corporation is the parent company of its wholly-owned subsidiary Goodrich Petroleum Company, L.L.C. The firm's current strategic focus is the development of oil resources and transitioning away from gas due to the current gas supply and price environment. Goodrich operates approximately 400 oil and natural gas wells in 29 fields located predominantly located in Texas and Louisiana. As of December 31, 2011, the company had proved reserves estimated at 463.5 Bcf of natural gas, 5.8 MMBbls of oil and condensate, and 0.5 MMBbls of natural gas liquids. According to Goodrich Petroleum's Quarterly Report to the SEC for the period ending September 30, 2012, revenues for the nine months ending 2012 were approximately \$132.6 million as compared to \$149.6 million for the same period in 2011. Goodrich is utilizing its experience in the Haynesville, Bossier, and Eagle Ford shale formations to develop the Tuscaloosa Marine Shale in Mississippi and Louisiana.

At the Stephens Fall Investment Conference in New York (November 13, 2012), Goodrich indicated its position in the Tuscaloosa Marine Shale (in Mississippi and Tuscaloosa) to be 156,000 gross/134,200 net acres. Statements by Goodrich indicate a net cost of approximately \$32 million, or approximately \$245 per acre for the 134,200 net acres it controls in the Tuscaloosa Marine Shale. During its November 13, 2012 presentation, the company indicated a 2012 budget of \$250 million, with 90% of drilling capex allocated to oil development. Approximately 16 percent of Goodrich's drilling capex allocation was directed towards the TMS (approximately \$40 million). The company's forward looking statements indicate a primary focus on the Eagle Ford Shale in Texas, with approximately 64 percent of its capex budget allocated to Eagle Ford development. In prior announcements, Goodrich had announced that it intended to run one rig in the TMS in 2012 and add or reallocate a second rig in 2013 pending outcomes; more recent statements in November indicate the addition of a second rig may be delayed pending outcome of drilling activities.

On November 13, 2012, the company reported that the Ash 31 H-1 is *"the first well in which the lateral was landed just above the zone that has caused wellbore instability, with a very favorable outcome, which if repeatable should materially reduce drilling costs going forward."*

Oil and Gas Production from the Tuscaloosa Marine Shale

June 2011 through May 2013

Source: Mississippi Oil and Gas Board

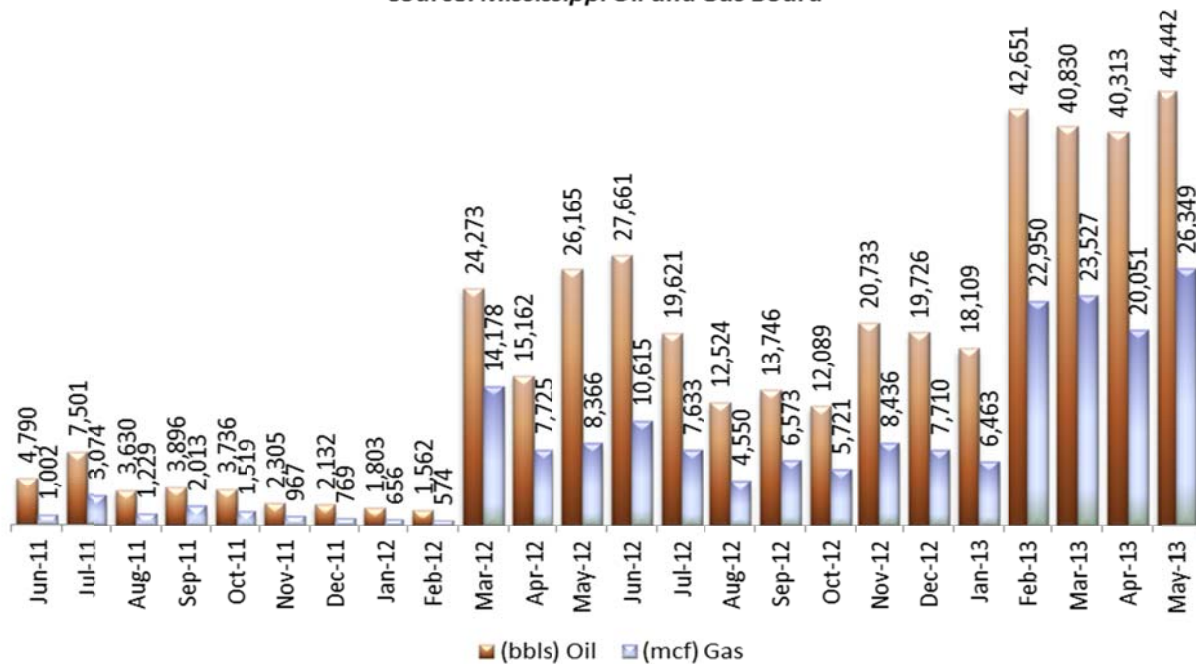


Figure 10: Oil and Gas Production from the Tuscaloosa Marine Shale June 2011 through May 2013 (Total Production prior to June 2011 was 16,135 bbl of oil from November 2000 through May 2011)

Oil production from the Tuscaloosa Marine Shale has been steadily increasing over the period from 2010 through 2013 as new wells come into production. For the one-year period from January 2012 through December 2012, total oil production from the TMS was 195,065 barrels of oil and 82,737 Mcf of gas; for the five-month period from January 2013 through May 2013, total oil production was 186,345 barrels of oil and 99,340 Mcf of gas. With increased exploration, development, and production from the TMS, the state of Mississippi will recognize new revenues associated with job creation, new industry spending, and related revenues. County governments located within the impacted area should experience new severance tax revenues associated with production and ad valorem taxes associated with the assessed values of pipelines as new wells come on line; municipal governments will experience increased ad valorem tax revenues and sales tax revenues associated with new spending that occurs within the municipal boundaries.

Field economics will be the primary determinant of the future development of the Tuscaloosa Marine Shale; the combination of the cost to drill, production levels, and oil prices will determine the rate at which companies continue to make investment. Currently, well costs are averaging approximately \$15 million for Encana and Goodrich; both companies are seeking to drive well costs down to a target range of \$10 to \$12 million.

Oil and Gas Severance Tax in Mississippi.

As per Mississippi Code § 27-25-505, the State Tax Commissioner apportions severance tax collection to the county in which the oil is produced in accordance with the following schedule:

- *On the first Six Hundred Thousand Dollars (\$600,000.00) or any part thereof, sixty-six and two-thirds percent (66-2/3%) to the state and thirty-three and one-third percent (33-1/3%) to the county.*
 - *On the next Six Hundred Thousand Dollars (\$600,000.00) or any part thereof, ninety percent (90%) to the state and ten percent (10%) to the county through June 30, 1989; eighty-five percent (85%) to the state and fifteen percent (15%) to the county from July 1, 1989, through June 30, 1990; and eighty percent (80%) to the state and twenty percent (20%) to the county for each fiscal year thereafter.*
 - *Above and exceeding One Million Two Hundred Thousand Dollars (\$1,200,000.00), ninety-five percent (95%) to the state and five percent (5%) to the county through June 30, 1989; ninety percent (90%) to the state and ten percent (10%) to the county from July 1, 1989, through June 30, 1990; and eighty-five percent (85%) to the state and fifteen percent (15%) to the county for each fiscal year thereafter.*
-

Prior to the passage of HB 1698 in 2013, the amount of severance tax (privilege tax) under Mississippi Code § 27-25-503, was measured by the value of the oil produced and assessed at the rate of six percent (6%) of the value of the oil at the point of production. However, when oil was produced by an enhanced oil recovery method in which carbon dioxide (CO₂) is used and that carbon dioxide is transported by pipeline to the oil well site, the tax is levied at three percent (3%) of the value of the oil at the point of production. Other exemptions exist within the Mississippi Code for discovery wells and production from two-year inactive wells; however, these regulations stipulate that the average monthly sales price of oil shall not exceed twenty dollars per barrel in order for these exemptions to apply. Natural gas and casinghead gas are also assessed severance tax at a rate of six percent (6%) of the value of the gas at the mouth of the well (§27-25-701); this excludes carbon dioxide (CO₂). To incentivize the exploration and development of oil and gas in the state of Mississippi, the Mississippi Legislature passed and the Governor signed House Bill 1698 during the Regular Session of 2013. HB 1698 amended the Mississippi Code to reduce the severance tax on oil and natural gas produced from horizontally drilled wells or horizontally drilled recompletion wells from which production commences from and after July 1, 2013, for a period of up to 30 months beginning from the date of first sale of production. Section 2, paragraph (c) of HB 1698 specifically applies to the development and production from the development of wells in the Tuscaloosa Marine Shale; this Section amends Section 27-25-502 of the Mississippi Code of 1972 to read as follows:

(c) (i). *“The tax shall be levied and assessed at the rate of one and three-tenths percent (1.3%) if the value of the oil at the point of production on oil produced from a horizontally drilled well or from any horizontally drilled recompletion well from which production commences from and after July 1, 2013, for a period of thirty (30) month beginning on the date of first sale of production or until payout of the well cost is achieved, whichever first occurs. Thereafter, the tax shall be levied and assessed as provided for in paragraph (a) of this subsection.”*

(c) (iv). *“This paragraph (c) shall be repealed from and after July 1, 2018; however, any horizontally drilled well or recompletion well from which production commences before July 1, 2018, shall be taxed as provided for in this paragraph (c) notwithstanding that the repeal of this paragraph (c) has become effective.”*

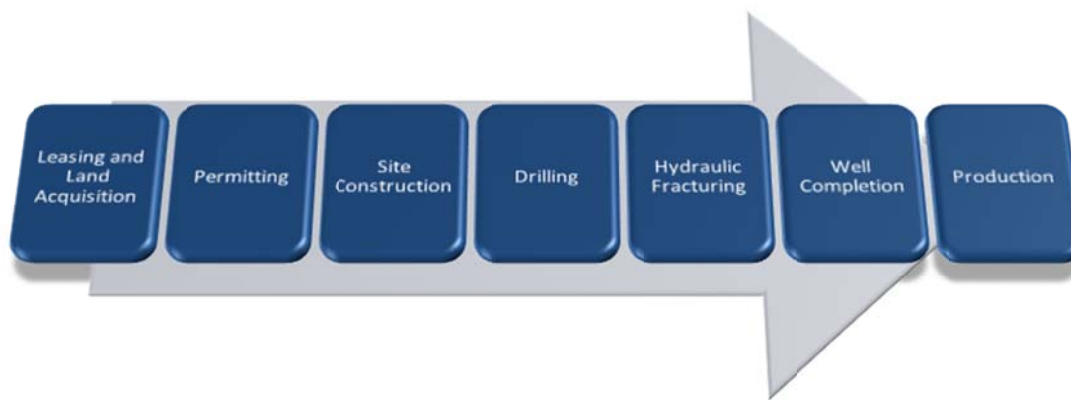
Gas production from horizontally drilled wells or from any

horizontally drilled recompletion well is treated the same as oil in HB 1698 and received a severance tax abatement that is identical to that of oil.

A comprehensive economic impact analysis of the development of the Tuscaloosa Marine Shale is beyond the scope of this report; at present, the rate of development of the TMS, to include the pace of drilling, the number of wells to be drilled, completion rates, well production, and related production decline curves are unknown. A future report will more accurately model this economic impact. This report examines only the economic impact of drilling a single well.

Well drilling activities are of limited duration and represent a one-time, short-term economic impact that is modeled as being terminated at the point of completion and the well coming into production. When multiple wells are being drilled concurrently or consecutively, this economic impact is magnified; although specific economies of scale may reduce total job creation, related labor income, and other economic effects. This model does not capture these effects. In Mississippi, the average TMS well has averaged six months from permit to completion and production. Upon production, the economic impact of the extraction of oil and natural gas is introduced into the model; as multiple wells enter into production, the economic impact is magnified and these effects are long-term.

To examine the potential impact of the development of the Tuscaloosa Marine Shale in southwest Mississippi, the Stennis Institute generated a preliminary economic impact analysis of job creation associated with drilling one well in the TMS. This model was based upon the assumption of a \$15 million cost to drill and used the first year production from the Anderson 17H #1. Production from the Anderson 17H #1 was 98,660 barrels of oil and 32,472 Mcf of gas during the period from May 2012 through April 2013; the model assumes an average price of \$100 per barrel for Louisiana Light Sweet Crude and an average natural gas wellhead price of \$2.50 per Mcf, and assumes that all production is sold. Based on this assumption (which underestimates actual prices during the period), the total value of the first year of production from the Anderson 17H #1 was \$9,947,180. In subsequent periods, the impact of production decline will reduce the value of production for each well; therefore, the production value for an individual well does not remain constant over time.



Industry-wide estimates indicate that approximately 800 worker-days are required to construct a well; this includes workers required to construct and drill the well and to construct access roads and pipeline gathering systems. On average, approximately five people, predominantly equipment operators, work on the construction of an individual well pad. Drilling activities for an individual well require about 12 workers and may take approximately 45 days to drill a deep well. Well completion requires approximately 15 workers and may take between 30 to 54 days, depending upon the depth of the well and the number of completion zones. Approximately 10 to 25 construction and supply-related workers are needed to install pipeline gathering systems. The construction of access road depends upon the location of wells and proximity to existing roads. On average, access roads take approximately one day to construct 1.5 miles of roads on flat terrain employing two to three crews consisting of approximately five workers; for sites with multiple well pads, it may take between 10 to 25 workers to construct trunk roads.

As shown in Table 10, the economic impact of activities associated with drilling a single well, with an expenditure of \$15,000,000, generates approximately 66.2 total jobs, of which 22.2 are direct jobs with average labor income of \$81,846. The impact of drilling activities creates significant indirect and induced job creation in the industry subsectors of: Architectural, Engineering, and Related Services; Restaurants; Transport by Truck; Legal Services; and Wholesale Trade Businesses.

The total tax impact (direct, indirect, and induced) from well drilling is estimated to generate approximately \$566,890 of tax related revenues (Table 12).

Table 10. Impact of Drilling Activities				
Impact Type	Employment	Labor Income	Value Added	Output
Direct Effect	22.2	\$1,817,000	\$5,329,411	\$15,000,000
Indirect Effect	25.4	\$1,238,579	\$1,903,080	\$4,108,272
Induced Effect	18.5	\$651,014	\$1,197,084	\$2,117,715
Total Effect	66.2	\$3,706,593	\$8,429,576	\$21,225,988
<i>Source: IMPLAN 2011 data</i>				

Table 11. Ten Industries Most Impacted by Drilling Activities (Direct, Indirect and Induced Impacts)				
Description	Employment	Labor Income	Value Added	Output
Drilling oil and gas wells	22.2	\$1,817,000	\$5,329,411	\$15,000,000
Architectural, engineering, related services	4.1	\$226,383	\$230,721	\$427,100
Food services and drinking places	2.9	\$54,616	\$77,834	\$157,585
Transport by truck	2.6	\$116,331	\$141,723	\$334,196
Legal services	2.4	\$152,943	\$238,113	\$319,199
Wholesale trade businesses	2.1	\$122,646	\$213,358	\$310,788
Real estate establishments	1.7	\$18,165	\$135,950	\$207,201
Management of companies and enterprises	1.6	\$132,192	\$152,411	\$285,812
Employment services	1.3	\$26,218	\$28,997	\$39,294
Services to buildings and dwellings	1.2	\$22,391	\$27,135	\$59,468
<i>Source: IMPLAN 2011 data</i>				

Table 12: Tax Impacts from Drilling Activities			
Description	Tax on Production & Imports	Households	Corporations
Dividends			\$2,815
Social Ins Tax- Employee Contribution			
Social Ins Tax- Employer Contribution			
Tax on Production and Imports: Sales Tax	\$257,569		
Tax on Production and Imports: Property Tax	\$142,872		
Tax on Production and Imports: Motor Vehicle Licenses	\$3,679		
Tax on Production and Imports: Severance Tax	\$6,507		
Tax on Production and Imports: Other Taxes	\$20,590		
Tax on Production and Imports: S/L Non Taxes	\$18,125		
Corporate Profits Tax			\$44,480
Personal Tax: Income Tax		\$47,229	
Personal Tax: Non-Taxes (Fines- Fees)		\$16,810	
Personal Tax: Motor Vehicle License		\$2,921	
Personal Tax: Property Taxes		\$1,377	
Personal Tax: Other Tax (Fish/Hunt)		\$1,917	
Total State and Local Tax	\$449,342	\$70,253	\$47,295
<i>Source: IMPLAN 2011 data</i>			

The economic impact of extraction of oil and natural gas from one well is shown in Table 13 below. As shown, these activities will generate approximately 71 jobs with total labor income of approximately \$2.6 million.

The industry sectors that experiences the greatest impact from activities associated with the extraction of oil and gas are Maintenance and Repair Construction of Non-Residential Structures; Restaurants; Support Activities for Oil and Gas Operations; and Architectural, Engineering, and Related Services (Table 14).

The tax impact of economic activities associated with the extraction of oil and natural gas are estimated to generate to be \$680,875 (Table 15). IMPLAN models for severance tax are derived from U.S. Bureau

Table 13. Economic Impact of Extraction of Oil and Natural Gas				
Impact Type	Employment	Labor Income	Value Added	Output
Direct Effect	29.1	\$719,511	\$2,765,806	\$9,947,180
Indirect Effect	29.8	\$1,413,015	\$2,079,438	\$4,100,696
Induced Effect	12.4	\$436,687	\$803,675	\$1,421,096
Total Effect	71.3	\$2,569,212	\$5,648,918	\$15,468,973

Source: IMPLAN 2011 data

Table 14: Ten Industries Most Impacted by Extraction Activities (Direct, Indirect, and Induced Impacts)				
Description	Employment	Labor Income	Value Added	Output
Extraction of oil and natural gas	29.3	\$725,754	\$2,789,804	\$10,033,489
Maintenance and repair construction of nonresidential structures	13.3	\$594,569	\$633,320	\$1,197,930
Food services and drinking places	2	\$36,571	\$52,118	\$105,520
Support activities for oil and gas operations	1.8	\$118,211	\$145,250	\$356,639
Architectural, engineering, and related services	1.7	\$93,118	\$94,902	\$175,679
Management of companies and enterprises	1.6	\$136,507	\$157,386	\$295,142
Real estate establishments	1.1	\$11,388	\$85,234	\$129,904
Services to buildings and dwellings	0.9	\$16,273	\$19,721	\$43,220
Wholesale trade businesses	0.8	\$48,406	\$84,208	\$122,661
Monetary authorities and depository credit intermediation activities	0.8	\$44,865	\$162,838	\$259,952

Source: IMPLAN 2011 data

Table 15: Tax Impacts from Drilling Activities			
Description	Tax on Production and Imports	Households	Corporations
Dividends			\$1,612
Social Ins Tax- Employee Contribution			
Social Ins Tax- Employer Contribution			
Tax on Production and Imports: Sales Tax	\$346,583		
Tax on Production and Imports: Property Tax	\$192,247		
Tax on Production and Imports: Motor Vehicle Licenses	\$4,951		
Tax on Production and Imports: Severance Tax	\$8,756		
Tax on Production and Imports: Other Taxes	\$27,706		
Tax on Production and Imports: S/L NonTaxes	\$24,389		
Corporate Profits Tax			\$25,466
Personal Tax: Income Tax		\$33,052	
Personal Tax: NonTaxes (Fines- Fees)		\$11,765	
Personal Tax: Motor Vehicle License		\$2,044	
Personal Tax: Property Taxes		\$964	
Personal Tax: Other Tax (Fish/Hunt)		\$1,341	
Total State and Local Tax	\$604,631	\$49,166	\$27,078

Source: IMPLAN 2011 data

of Economic Analysis National Income and Product Accounts; the U.S. value is then distributed to states based upon each state's proportion of severance tax using data from the U.S. Census of State and Local Government Finances; as a result, the model significantly underestimates severance tax revenues associated with the economic impact of the extraction of oil and natural gas. For example, as shown in Table 15, the model estimates severance tax revenues to the state to be

\$8,756; however, based upon production valued at \$9,947,180 from the Anderson 17H #1 with a 6% severance tax, it can be estimated that severance tax revenues would actually be approximately \$596,830.

The activities of the oil and gas industry in the state of Mississippi create significant economic multiplier effects through the state's economy. This impact is the result of the capital intensive nature of production and drilling, the large amount of purchases made by the oil and gas industry from other businesses in the state, high average wages paid to workers, and the stream of tax revenues generated from severance tax on oil and gas production and ad valorem taxes on oil and gas pipelines. This impact reaches every geographic region in the state of Mississippi.

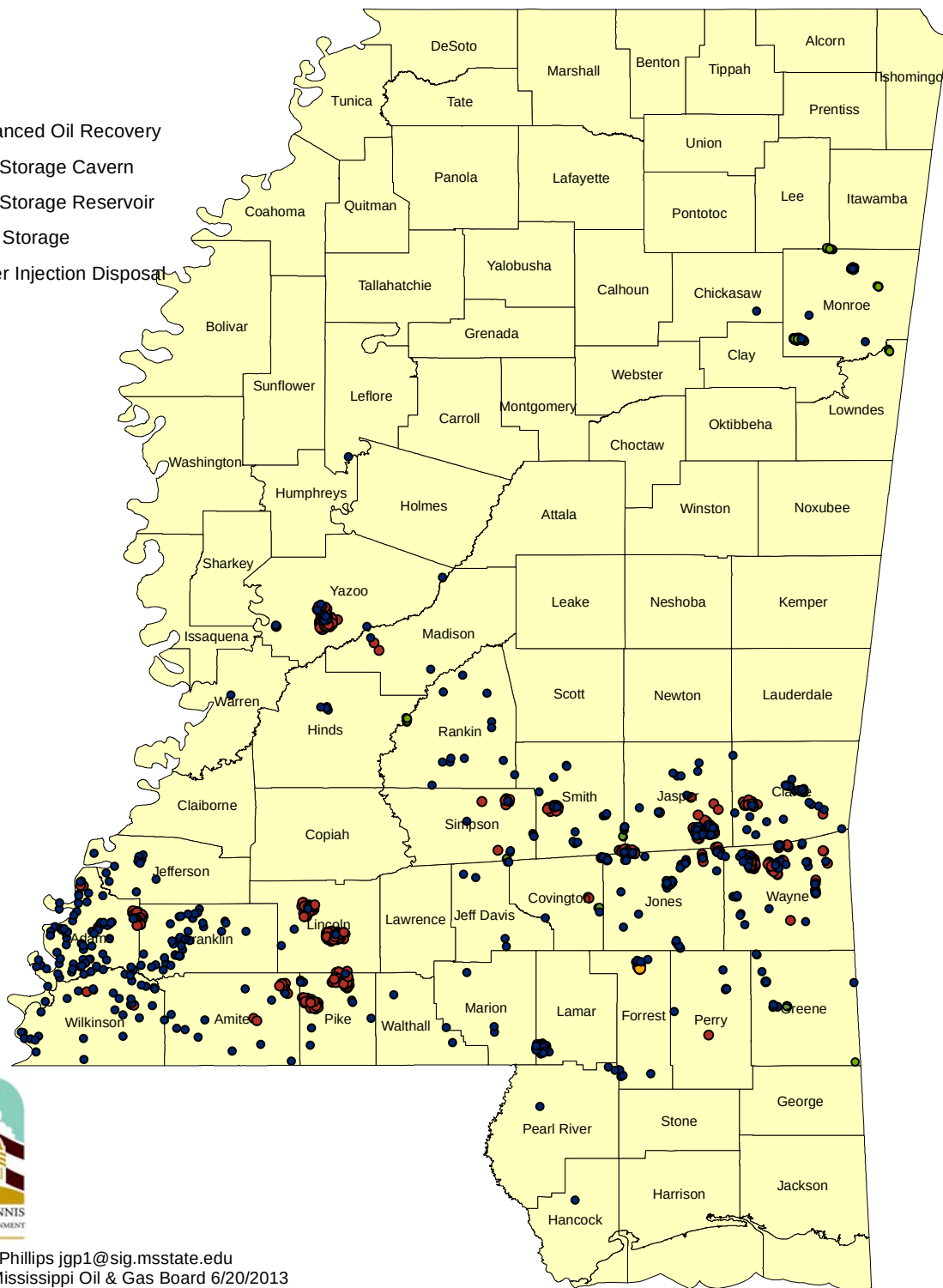
To fully maximize the potential benefits of the oil and gas industry and to capture these economic benefits within the state of Mississippi requires developing a skilled labor force within the state and attracting businesses that are in the industry, or suppliers to the industry, to locate within the state of Mississippi. As stated by Governor Phil Bryant, *"The world's energy demands will continue to grow, and Mississippi is in the position to become a dominant force in the energy industry."*

Active Injection Wells

Legend

TYPE

- Enhanced Oil Recovery
- Gas Storage Cavern
- Gas Storage Reservoir
- LPG Storage
- Water Injection Disposal



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