

THE QUIET BOOM!

by

Bob Sprehe, Energy Economist, Technology Assessment Division

Dave Elfert, Geologist, Office of Conservation

Alan Boyd, Forester, Weyerhaeuser Company

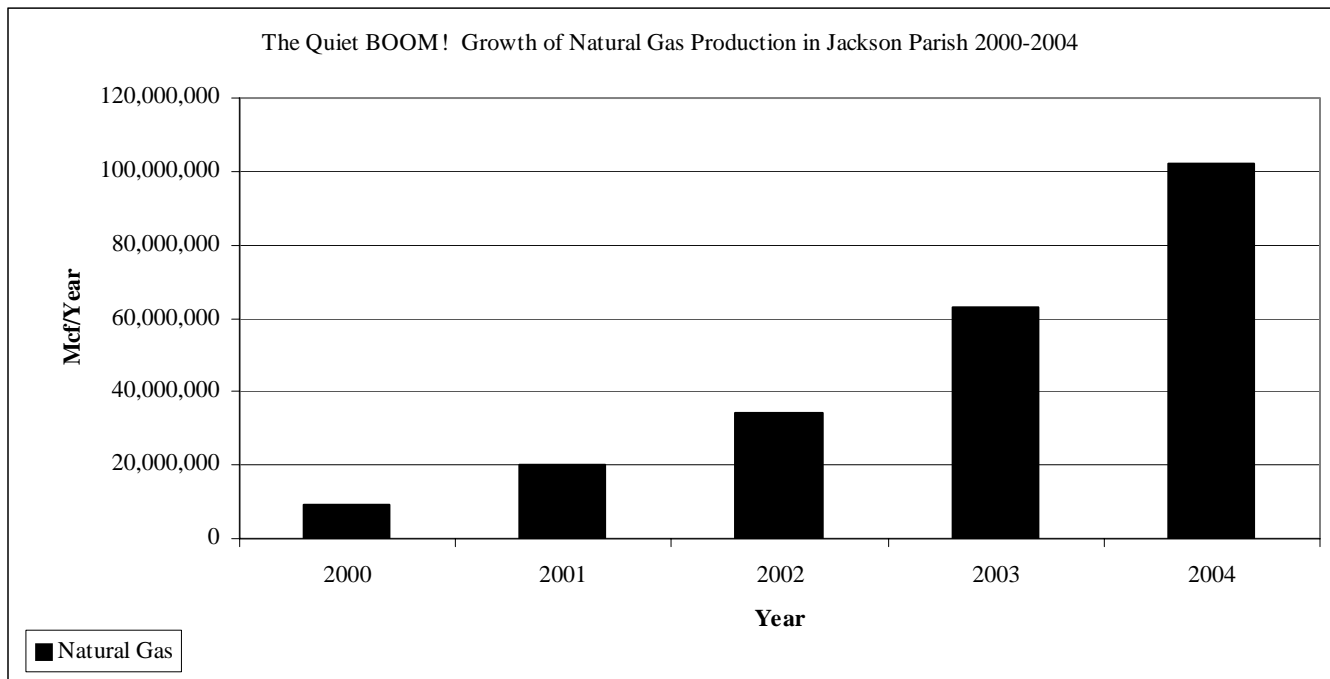
Eric Baka, Department of Wildlife and Fisheries

In the oil and natural gas industry, there are very few things that are quiet, especially new discoveries and subsequent drilling booms. Jackson Parish, La. is the exception.

In a very quiet manner, led by Anadarko Petroleum Corp., a revolution in deep drilling in North Louisiana (15,000 ft. +/-) has been underway since 2001. Through April 2005, Anadarko has drilled and completed 258 of these deep (15,000 ft. +/-) high pressure, high temperature Lower Cotton Valley natural gas wells. According to records available in the Office of Conservation, Anadarko invested nearly \$201,600,000 in just 55 wells, an average of \$3.7 million per well.

The result for the Jackson Parish Police Jury and Parish Administration and the State of Louisiana Department of Natural Resources is another successful model program of how state agencies and the private oil and gas sector can cooperate in commercial exploitation of deep energy reserves while sustaining responsible environmental practices in sensitive surface areas, including wetlands, and preserving the habitat of an endangered species, the red cockaded woodpecker. This is a regulatory economic model all political bodies should learn from and seek to emulate.

Figure 1. Jackson Parish Natural Gas Production Is Growing Exponentially



North Louisiana — of which Jackson Parish and the Vernon Field specifically are the dominant geologic features at this time — accounted for more than 20 percent of the nation’s natural gas reserves added between 2001 and 2003, according to data published by the Energy Information Administration.

This is a very significant contribution to the nation’s natural gas deliverability base at a time when political leaders are questioning the reliability of the domestic natural gas supply.

Table 1.
Jackson Parish Natural Gas Reserves are a significant portion of the Nation’s Deliverability Base
Dry Natural Gas Proved Reserves, and Reserve Growth, Tcf¹ 2001-2003

<u>Year</u>	<u>U. S.</u>	<u>North LA</u>	<u>%</u>
2003	189,044	5,074	2.68%
2001	<u>183,460</u>	<u>3,881</u>	2.12%
Increase	5,584	1,193	21.36%

Source: Energy Information Administration

U. S. Crude Oil, Natural Gas, and Natural Gas Liquids Reserves, 2003 Annual Report

1. Tcf = Trillion Cubic Feet

Geology

Industry has recognized the potential for natural gas exploitation in the Vernon Field area since the early 1980s. More precise seismic interpretation, combined with successful experience in large, water-based fracturing techniques in East Texas and Oklahoma, have made commercialization of these deep (15,000 feet +/- total vertical depth [TVD]) Lower Cotton Valley sands viable at this time.

The two most active and prolific areas of the Vernon Field are the northern fault block, located approximately in Township 16 North, Range 2 West, (T16N, R2W) sections 9-12, and the southern fault block, located in T16N, R2W sections 28-30. Both of these areas are structural traps in the Lower Cotton Valley. Other areas of the Vernon Field also hold potential and will be exploited in the future.

There are lesser accumulations of natural gas reserves in the Upper Cotton Valley and the Hosston formations. The geologic age of the Hosston is Lower Cretaceous, while the Cotton Valley is Jurassic in geologic age.

While 258 wells have been completed through April 2005, Anadarko has not yet defined the limits of the potential producing zones. General Manager for the Eastern Gulf Coast Operations, Bob Stancil, suggests that as many as 400 wells may be drilled. Currently, Anadarko has nine rigs drilling (see Figures 2 and 3 on the following pages). Sand thicknesses in the producing wells run between 1,500 and 3,000 feet. Currently, this thickness allows for 40-acre well spacing. Future experience with reservoir drainage patterns may allow well spacing to drop to 20 acres.

Figure 2. Oil and Gas Map of Jackson Parish

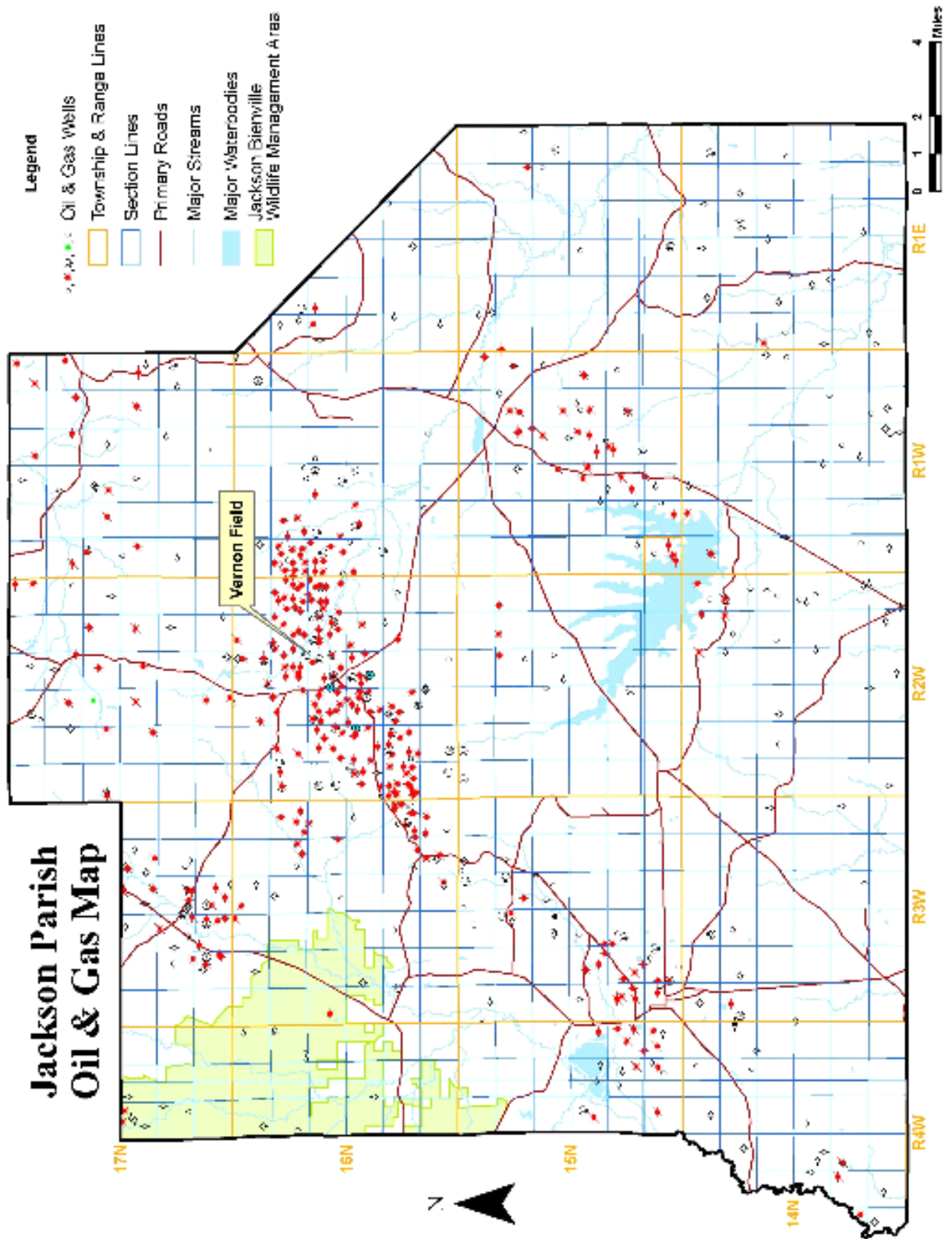
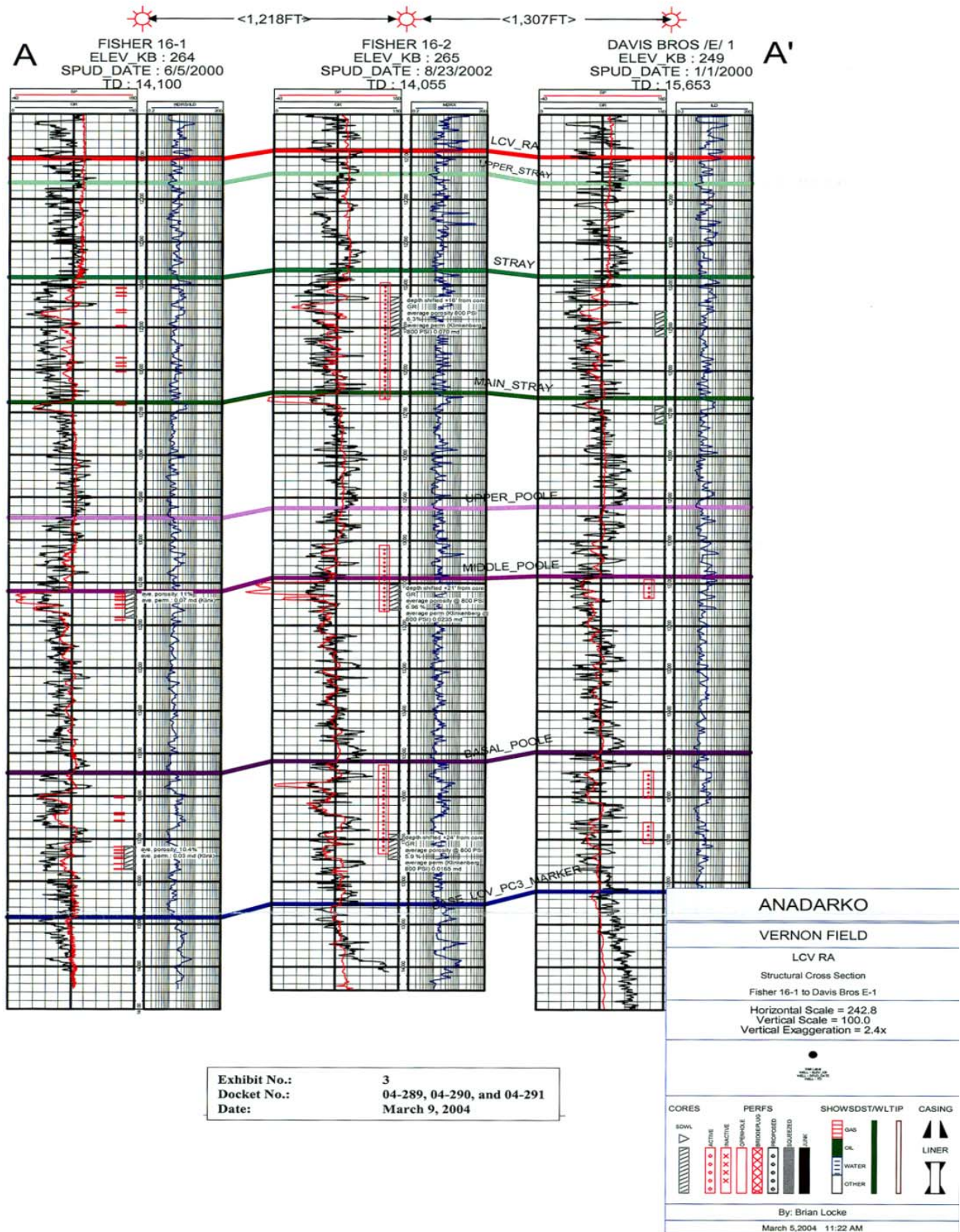


Figure 3. Cross Section of LCV from Anadarko Filing with Office of Conservation



Well Construction Plans

Besides conductor pipe driven to begin the drilling process, Anadarko sets three strings of casing: surface pipe to cover the fresh water bearing horizons, a protective casing string into the pressure transition zone below the Knowles lime and a production string to total depth (TD).

The LCV is geo-pressured, meaning that formation pressures exceed a normal salt water gradient. High mud weights are required to drill into the LCV pay zone.

The wells are perforated at multiple levels across the LCV pay interval. Several frac jobs of fresh water and sand, followed by a flush of fresh water to push the sand propping agent back into the formation, are run through the perforated intervals, and production flow is commingled.

So far, Anadarko has not located a free water level in the Lower Cotton Valley. Initial flow rates range from three to 15 million cubic feet per day (MMcf/day). The wells subsequently exhibit a hyperbolic decline curve over the long life expectancy of reservoir production.

Figure 4. Drilling Rig at Work in Anadarko's Vernon Field, Jackson Parish, Louisiana



Wetlands, Woodpeckers, and Water

There is a long history of sustainable environmental development harmony between Louisiana's legislature, state regulatory agencies, parish governments, and oil and gas extraction industries.

Jackson Parish is a recent example of just that harmony. There are wetlands in the Vernon Field. The endangered red-cockaded woodpecker makes its habitat among the woodlands in the Vernon Field, and rig water supply is drawn from the Sparta Aquifer which is present at very shallow depths (approximately 500 ft. subsea +/-) in the Vernon Field.

Anadarko complies fully with the wetlands permit requirements and restoration. The endangered species

habitat is avoided, and rig water supply wells are plugged and abandoned (P&A) as required by State law when no longer needed.

The harmony of subsurface development of scarce natural gas resources, while respectfully using and preserving valuable environmental assets, is a Louisiana model for all political bodies around the globe to emulate.

Weyerhaeuser Company, a major forest landowner within the Vernon Field, can attest to the environmentally responsible approach taken by Anadarko. When Anadarko first began operations in the Vernon Field, they were informed of Weyerhaeuser's detailed environmental expectations with respect to road, pipeline, and well site construction – especially when in proximity to streams, other wetlands, and special sites such as nesting and forage habitat for the red-cockaded woodpecker.

A systematic process of communication has resulted to ensure that all aspects of environmental concerns are addressed. Once Weyerhaeuser receives a request from Anadarko to review proposed activity, the information is distributed to the appropriate Weyerhaeuser managers, foresters, researchers, and environmental personnel for their review and recommendations. These comments are then accumulated and forwarded to Anadarko for their consideration.

Weyerhaeuser managers say Anadarko's reception of this feedback and their resulting environmental performance has been nothing less than impressive, not only meeting, but exceeding Weyerhaeuser's expectations. Much detailed and costly effort by Anadarko has gone into executing this process to meet their goals while also protecting the long-term sustainability of Weyerhaeuser's land, water, and wildlife resources.

Some specific examples demonstrating Anadarko's desire to incorporate ecologically-friendly practices include their considerations for wildlife when conducting operations within the Jackson-Bienville Wildlife Management Area. Anadarko is working with Louisiana Department of Wildlife and Fisheries (LDWF) biologists to consider planting special wildlife seed mixes along pipelines and road rights-of-way and adjusting mowing schedules to accommodate turkey nesting. Also, when possible, Anadarko is minimizing their "footprint" and avoiding environmentally sensitive areas in the WMA by drilling multiple wells on a single pad and by using directional drilling technology. These efforts are a formula that adds up to enhanced wildlife habitat and retention of biological diversity.

Economic Payoff

With 258 wells completed as of the end of April, 2005, and an average investment of \$3.7 MM/well, Anadarko has close to a \$1 billion dollar investment in Jackson Parish to this point in time.

Additionally, Anadarko has built an office facility and a natural gas liquids stripping plant. Others have invested in new pipeline capacity to transport the natural gas production from the field to nearby interstate natural gas pipelines and on to the Midwest and East Coast population centers.

Even at this early stage of economic evolution, three other factors illustrate the economic impact in Jackson Parish of this harmonious coexistence of oil and gas extraction and environmental preservation: ad valorem assessments, Louisiana adjusted income tax, and sales taxes collected.

Figure 5. Ad valorem assessments on Wells have increased over \$12,000,000 between 2000 and 2004

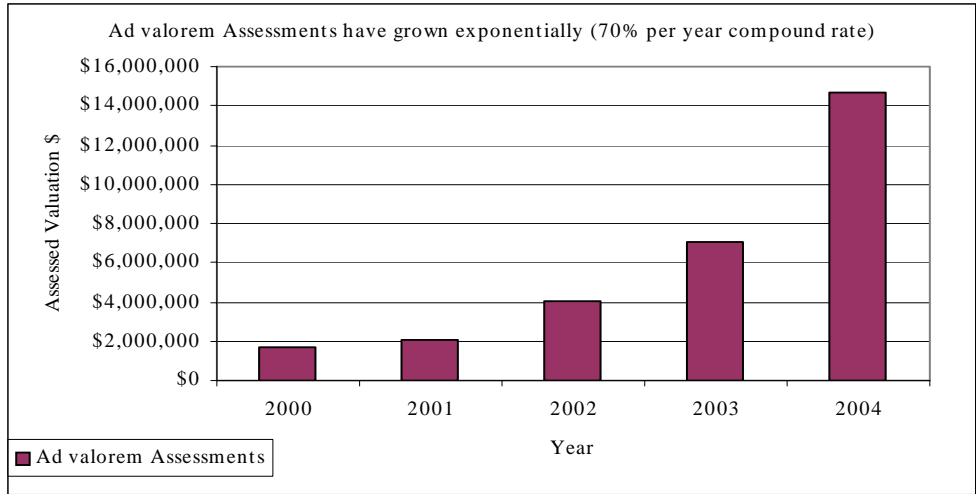


Figure 6. Louisiana Adjusted Income Tax from Jackson Parish has Increased at a 5% per Year Rate

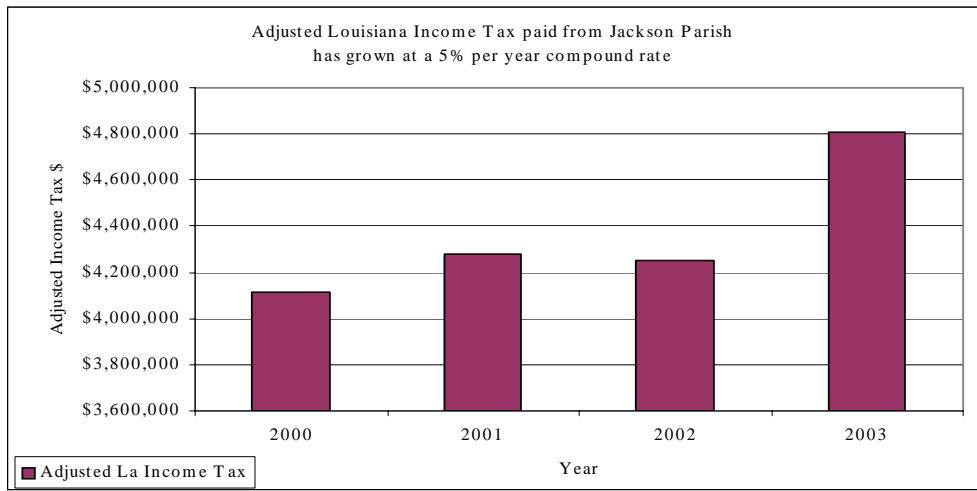
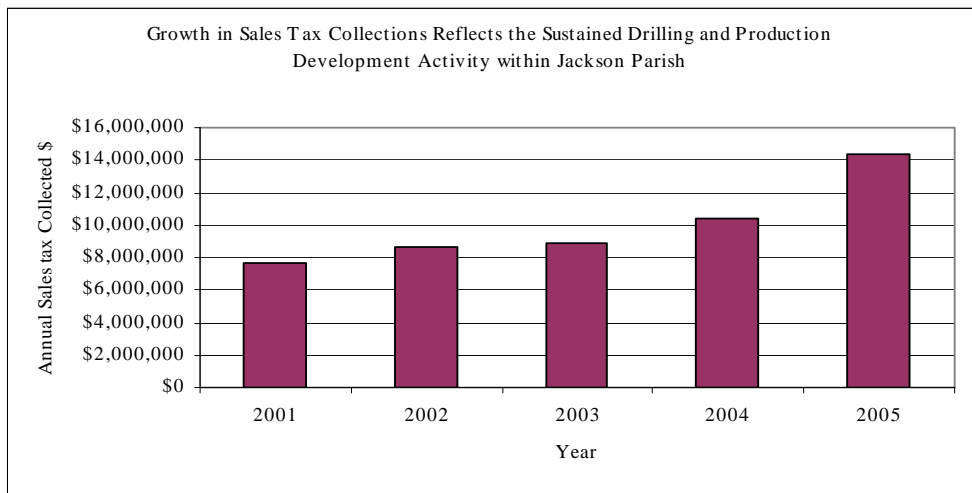


Figure 7. Sales Taxes Collected in Jackson Parish have Increased by 75% from 2000 to 2004



“...Win, Win, Win, Win...”

In the Real Estate world, value is characterized as “...location, location, location...”

With the kind of valuable cooperation and knowledge present in the state administration, legislature, regulatory agencies, the private sector, oil and gas companies and landowners, Anadarko **wins**, Jackson Parish **wins**, Louisiana’s residents **win and** the landowners **win**. And, the nation’s consumers **win** with increased natural gas supply and a corresponding slowing of natural gas price increases that otherwise would not have been available.

Louisiana is diligently at work to multiply “The quiet BOOMs!”

