

The Permian Basin, home to many of America's oldest oil fields, covers 75,000 square miles of West Texas and southeastern New Mexico. Discovered in 1921, the formation has produced more than 40 billion barrels of oil, including much of the oil used during World War II. Until recently, the Permian Basin's biggest challenges were to slow the loss of production—which began ebbing in 1973—while squeezing out the last 30 billion barrels of “mobile” oil as economically as possible. That was before innovation, technology and \$100-per-barrel oil offered the aging fields a new future.

The breakthrough arose in the Midland area's Spraberry oil field, among the Permian Basin's most venerable locations. Spraberry formations were fractured for decades, usually in one or two zones, for vertical wells. The innovation: drilling vertically while emulating the multistage fracturing typical of horizontal wells. The lateral section of a horizontal well can be drilled at 4,000–8,000 feet, with many stages of fracturing along the way. Spraberry wells were drilled vertically, but by going deeper, the number of oil- or gas-producing zones increased. By fracturing each producing zone—perhaps a dozen of them—the

wellbore increasingly came to look like the lateral section of a horizontal well. The result spawned a boom in the eastern Permian Basin in 2005, reversing years of decline.

The Permian Basin's second chance at new life parallels earlier development of the Eagle Ford in South Texas (*see related article, page 3*). Horizontal drilling and fracturing could produce oil from shale—and the western Permian Basin is rich in shale—instead of concentrating only on the remaining 30 billion barrels of mobile oil.

The Delaware Subbasin encompasses the Hobbs area of southeastern New Mexico and four counties of West Texas and is home to the Avalon and Wolfcamp shale, as well as three layers of Bone Spring shale. Together, they provide rich targets of oil and natural gas liquids.

Shale development is just beginning in the Delaware. A Texas General Land Office lease auction in April 2011 brought a bid of \$3,264 per acre for 30,000 acres (\$9.8 billion in total), compared with an average bid of \$906 per acre six months earlier. Drawing on the Eagle Ford model, the Delaware offered shale rich in liquids, plus well-developed infrastructure and

skilled labor, heralding a major transition.

Partly because these developments are relatively new, production data don't yet reflect the magnitude of the changes. Oil production in the Delaware during 2011 was 13 million barrels above that in 2008 (when the price peaked), while natural gas production declined significantly. Revenue from oil and gas production increased \$1 billion from 2008 to 2011.

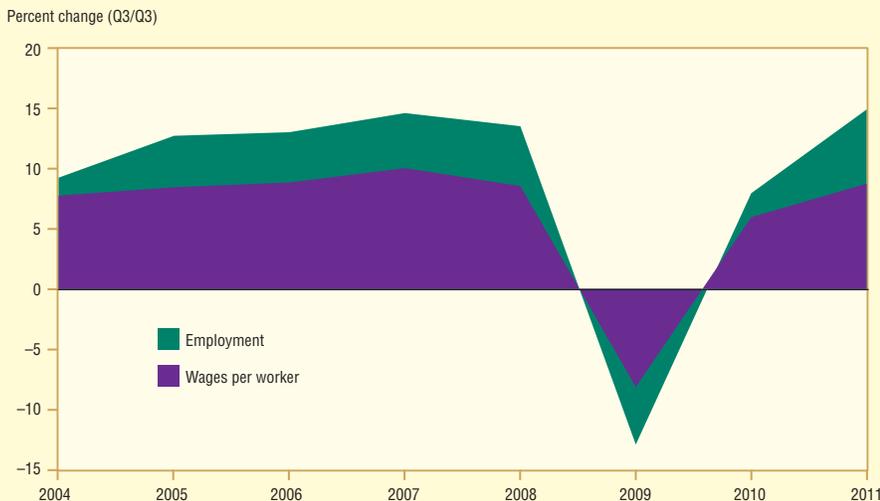
As production has grown in the Eagle Ford and Bakken oil shale regions, a shortage of infrastructure to transport the product to market has been a key constraint. Moving new natural gas liquids to the 1-million-barrel-per-day market on the Gulf Coast has posed the greatest problems. The mature Permian Basin, with a rich infrastructure in place, enjoys the advantage of expanding on existing transportation systems rather than starting from scratch. And significant expansions are under way, with new gathering systems and fractionation capacity in the Avalon shale. Additionally, a rail terminal and several pipelines are under construction to move product to Houston.

The stories of the Permian Basin's tight labor markets are the stuff of legend—restaurants half-open for lack of workers, the local fast food place importing wait staff from eastern Europe. Labor markets in the Delaware were tight before the shift to shale began, and they remain so. A 15 percent increase in total wages last year was driven by a 6.2 percent jump in employment, accompanied by an 8.8 percent increase in wages paid per worker (*Chart 1*). Labor shortages in the lucrative oil sector drive local wage increases, leaving other segments to compete for workers.

And that nearly frenetic activity level is increasing. Drilling in dry gas-producing areas such as the Barnett and Haynesville shale regions significantly pulled back following the collapse of natural gas prices to nearly \$2 per thousand cubic feet during the winter. Producers and service companies are rapidly shifting rigs and hydraulic fracturing crews into shales rich in oil and natural gas liquids. Thus, while overall drilling activity has cooled in recent months, the Permian Basin has picked up the pace.

—Robert W. Gilmer and Jesse B. Thompson III

Chart 1
Total Wages Rise as Shale Extraction Moves to Permian Basin
(Annual growth of wages in the Delaware Subbasin)



SOURCE: Quarterly Census of Employment and Wages, Bureau of Labor Statistics.