



Tech Talk - Gulf of Mexico production and hurricanes

Posted by [Heading Out](#) on August 1, 2011 - 11:00am

Topic: [Supply/Production](#)

Tags: [bp](#), [crude and condensate production](#), [crude oil production](#), [dennis](#), [gulf of mexico](#), [hurricane katrina](#), [hurricane prediction](#), [hurricane rita](#), [hurricanes](#), [natural gas production](#), [thunder horse](#) [[list all tags](#)]

The summer brings back hurricane season, with the threat that such storms bring to the oil and gas well operations in the Gulf of Mexico. And the National Oceanic and Atmospheric Administration (NOAA) [has noted that](#)

The Atlantic basin is expected to see an above-normal hurricane season this year, according to the seasonal outlook issued by NOAA's Climate Prediction Center . . . 3 to 6 major hurricanes (Category 3, 4 or 5; winds of 111 mph or higher)

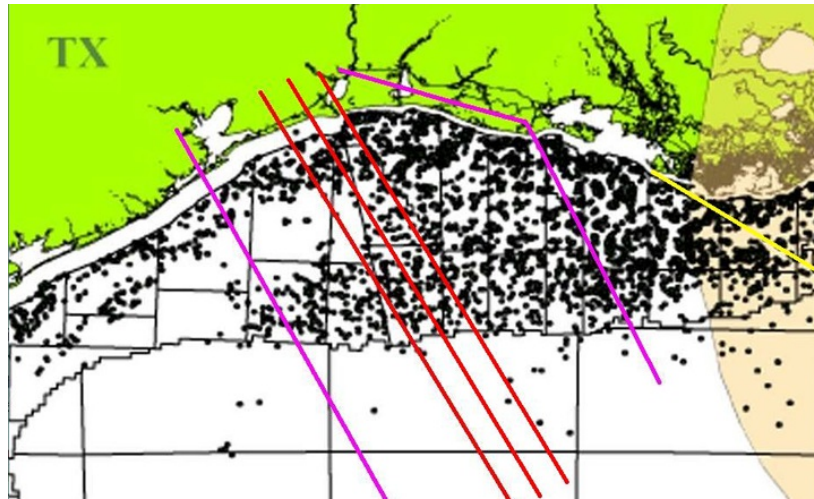
The lessons of this vulnerability were, perhaps, more than most years, evident in 2005. The first sign of problems came with the arrival of [Hurricane Dennis in July](#). It was a storm which severely damaged the BP deep water [Thunder Horse drilling platform](#).



Thunder Horse after Hurricane Dennis

As that season wore on, the vulnerability of the platforms in the Gulf and the refineries that

border it, were exposed in more intensity with the passage of Hurricanes Katrina and Rita. These threats and their analysis were one of the factors that helped, in that formative year, to bring an audience to the pages of The Oil Drum. The Gulf is now home to thousands of wells which, as the evidence from the Deepwater Horizon disaster last year reminded us, has moved further and further away from shore. That vulnerability is perhaps illustrated by a map showing the path of Hurricane Rita through the oil platforms off the Texas and Louisiana coasts.



Path of Hurricane Rita through off-shore Gulf production facilities ([The Oil Drum](#)) (Each dot is a production unit)

Back in the 1930's and '40's it was the very gradual deepening of the seabed in the Gulf that allowed the first oil drillers to venture through the swampy regions of the Mississippi Delta and then on out into the waters of the Gulf. There had been some drilling from piers out [in California](#) and similar constructions were also tried along the Louisiana shore as the prospects for success tempted companies away from the coast. However, as they did so the rigs faced the challenge, as they do today, of surviving in regions where hurricanes are not uncommon. The industry was helped in this development since there were no major hurricanes that moved through the regions of most intense drilling, from the first wells in [1945 until 1964](#) when Hurricane Hilda arrived. And even when that hurricane struck on October 3rd, it only damaged three locations, at Eugene Island and Ship Shoals 149 and 199, with a total of some [11,869 bbl of oil being spilled](#) due to the storm.



Gulf of Mexico showing regional features ([Geoexplor](#))

The first pier-based platform had been built out into the Gulf of Mexico at McFaddin Beach south of Port Arthur, Texas after having been approved by the Secretary of War, on July 8, 1937. The pier was a mile long, with three rigs at the far end, but it only drilled dry holes and was destroyed in a [hurricane in 1938](#). More widely recognized was the first well to be drilled out of sight of land. This was the Creole platform near Cameron, which was a mile out-to-sea, an hour-an-a-half trip [by shrimp boat](#) at the time. The water was only 18 ft deep and the well, initially drilled by Pure Oil and Superior Petroleum, (later Kerr McGee, and then Anadarko) sat some 15-ft above the water level. Initial production was [600 bd from a depth of 9,400 ft](#). It was damaged by a hurricane in 1940, but survived and produced more than four-million barrels since through directional drilling.

Kemnac Rig 16 drilling the first offshore well in the Gulf of Mexico (Kerr-McGee via [Penn Energy](#))

As was the case with California, there was initially some controversy over who owned the rights to minerals off-shore and in 1953 Congress passed the [Submerged Lands Act](#), which gave the rights to the states for the first three miles offshore (the range of a smooth bore cannon at one time) and then the [Outer Continental Shelf Lands Act](#) which gave the rights for the more offshore land to the Federal Government. This settling of the disputes encouraged further drilling and while there were already 70 rigs drilling at depths up to 70 ft of water, the years after 1953 saw the development of a variety of [different rigs for drilling in ever deeper water](#). Designs to cope with hurricanes also progressed, so that by the time of Hurricane Flossy in 1956 rigs were relatively safe. It was followed by [Audrey](#) in 1957, ranked as the sixth deadliest hurricane in US history, which came ashore at Cameron, and killed 416 people, but caused \$16 million in damage offshore, [with no fatalities](#).



Path of [Hurricane Flossy](#) in September 1956. (Note I have referenced the web pages showing the storm paths under the Hurricane name in that which follows).

Technology was, however, allowing rigs to work in ever deeper water - 100 ft of water in 1957, 225 ft by 1965, and 300 ft in 1969. With this increase in range came increased production, which had reached 2 mbd, but it also exposed more rigs to the threat from larger storms. [Hilda](#), formed in 1964, caused \$100 million in damage and effectively destroyed 18 platforms; [Betsy](#) in September 1965 had the distinction of financially impacting a future President of the United States.

On September 9th, the day Hurricane Betsy struck, MAVERICK was located 20 miles off the Louisiana Coast in 220 ft of water. The following day an inspection showed Zapata's three other rigs were undamaged, but the MAVERICK had vanished. This was the largest single loss that the domestic offshore drilling industry sustained in this or any other hurricane. . . . The MAVERICK loss was a substantial one for Zapata. This was our newest rig and one of our very best contracts. . .

(George H.W. Bush, "[My Life in Letters and Other Writings](#).") (The insurance check was for \$5.7 million).

[Camille](#) in 1969 was [the largest storm](#) to hit the USA in the 20th century. It did about \$100

million in offshore damage, including sinking three up-to-date rigs designed to survive those storms. (Camille was a Category 5). Onshore the damage exceeded \$1 billion. This was the hurricane that taught the industry that they had to design rigs that could not only withstand waves more than 70-ft high, but has also to consider that the seabed itself might move under the force of the storm.

Fortunately such storms have proved to be relatively rare, and the “three strikes” of [Dennis](#), [Katrina](#) and [Rita](#) in 2005 have not been repeated since. Yet the industry remains highly vulnerable to such storms. As the second figure shows, the Gulf has become increasingly filled with production platforms. In 2008, this region was hit by hurricanes [Gustav](#) at the start of September and [Ike](#) two weeks later. Even though these were weaker storms, their impact was significant.

Effective August 2008, there were more than 3,800 production platforms in the Gulf, ranging in size from single well caissons in 10 feet of water up to a large, complex facility in 7,000 feet of water. The MMS estimates about 2,127 production platforms were exposed to hurricane conditions from Gustav and Ike, carrying winds greater than 74 miles per hour.

Final results of the agency’s assessment of destroyed and damaged facilities from these two storms indicate that 60 platforms were destroyed. These included some platforms that had been reported earlier to have extensive damage.

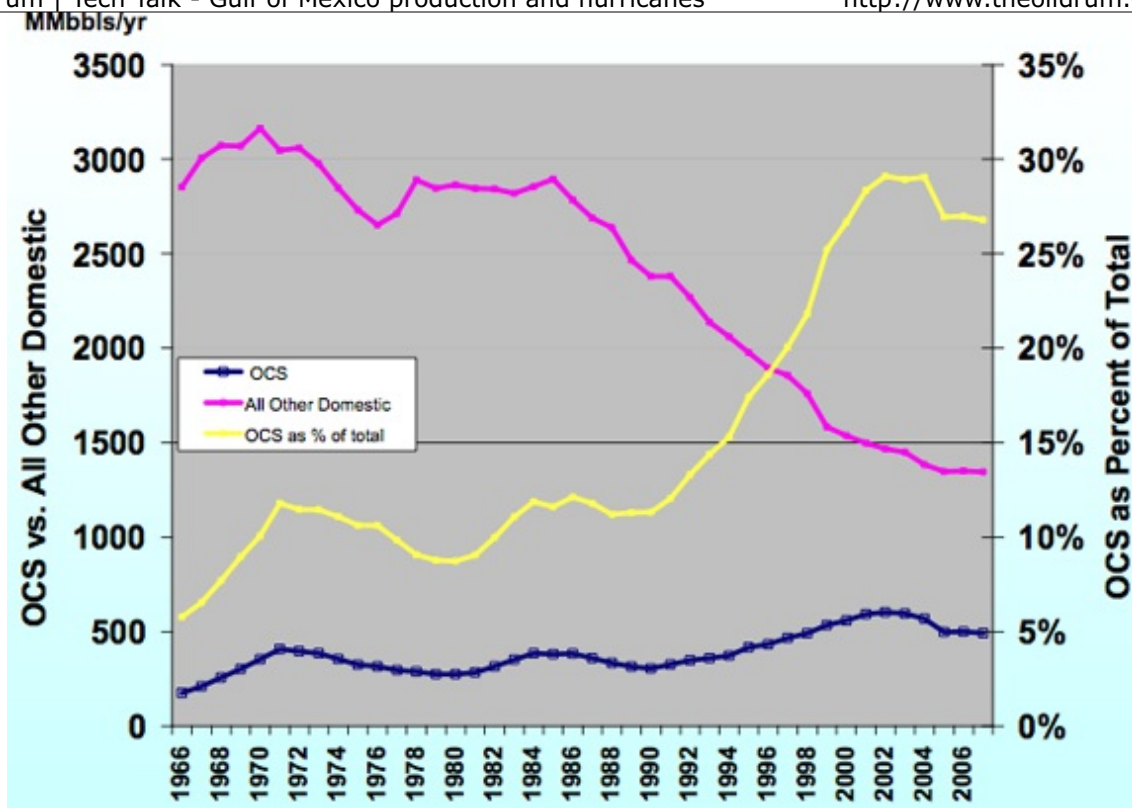
In comparison, 115 platforms were destroyed by the Rita-Katrina wallop in 2005.

The platforms designated as destroyed following Gustav and Ike produced 13,657 barrels of oil and 96,490,000 cubic feet of gas per day, or 1.05 percent of the oil and 1.3 percent of the gas produced daily.

Part of the reduction in damage came from lessons learned from Katrina/Rita.

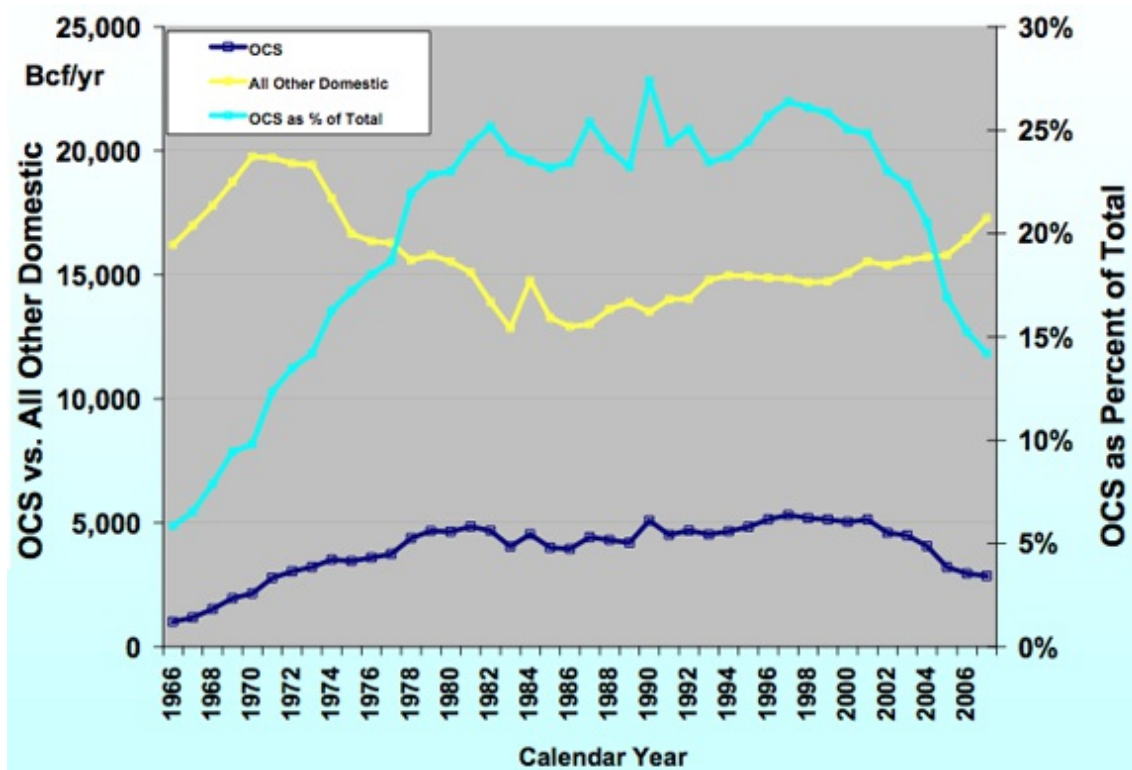
Mobile Offshore Drilling Units (MODUs) that previously had to have eight mooring lines were now required to have 12 and, in some cases, 16 mooring lines,” Angelico said. “In ’08, 18 moored MODUs were in the path of hurricane force winds, and two went adrift, which represented 15 percent of the rigs out there. In Katrina and Rita, 63 percent of the rigs went adrift.’

There are additional impacts from these storms. The Gulf [continues to produce](#) about 27% of the nation’s oil, and 15% of the natural gas. Those fuels must be brought ashore and, in the case of oil, refined. Refineries lie inshore all along the Gulf Coast, and if flooded can take months to be brought back on line. Given the growing reliance that the country places on production from these regions makes us all vulnerable to the season.



Outer Continental Shelf (OCS) Crude and Condensate as an annual volume and percentage of national production. ([BOEMRE](#))

Last October, OCS crude and condensate production averaged 1.52 mbd, which comprised 28% of the estimated US production.



Offshore Natural gas production as an annual volume and percentage of national production

([BOEMRE](#))

Last October natural gas production averaged 5.6 bcf/day which was [8.9% of estimated national production](#).

There is a significant production from smaller, older wells, while the new fields are found in deeper waters further into the Gulf, and so that is where I will venture next time.



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