Offshore Oil and Gas System, 1; Hurricane Andrew, 0

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One year ago Hurricane Andrew roared across Florida, a mammoth storm that sawed its way through the state and ripped it apart. It raged across the peninsula, shredding everything it touched.

The massive storm erupted from the mainland and charged across the Gulf of Mexico, then swung north and ripped into southern Louisiana. It gnashed and flooded and slashed until its strength was spent, and then it calmed.

"Calm" is a relative term. Days later, Mid-Atlantic states endured blasts of wind and rain from the storm's rag-tag remains.

From there, Andrew drifted back over the ocean and dispersed. It left incredible devastation on many of the lands it had crossed.

Some storms leave hopscotch patterns of damage; mosaics of destruction. Not Andrew. One resident told USA Today, "I've seen Agnes, Camille, Hugo and many a blizzard. I've never seen anything like this." Months later, visitors were awed by the expanse of the destruction.

The numbers numb the mind: 80,000 homes were turned to splinters. At least 27 people died, and 200,000 were left homeless. Some 80 percent of south Florida's farms were shredded, and at least one-quarter of Louisiana's sugar crop was destroyed. A year later, whole communities are still trying to put their lives back together.

But as horrifying as the storm's effects were, they could have been much worse. In the Gulf, Andrew churned through some of the most heavily developed offshore oil and natural gas fields on the globe. A massive network of natural gas and oil exploration and production structures, pipelines and related equipment stood at risk as the storm approached. Nearly 3,900 oil and gas platforms and other facilities in the Gulf of Mexico awaited the 165-mile-per-hour winds and 60-foot waves that were about to pound them.

The network's survival was to depend on years of research into safeguards and second and third back-up systems; on decades of tests and work-site trials and designing and redesigning of thousands of interconnected parts. A storm which flattened most shoreside structures it touched would be the ultimate test of technology and operating procedures designed to protect humans, the Gulf's rich sea life and some of the most biologically productive shoreline on the continent.

The winds and the waves came, raged, and passed. And the system survived.

Nearly all of the structures rode out the storm unharmed, or with minor damage. Resource losses from the storm were minimal, and production was nearly back to pre-hurricane levels long before the shoreside relief effort and cleanup had even fully begun.

The final tally: the storm's path overlay more than 700 structures. Only 22, mostly older facilities, were felled. Some 65 others sustained varying degrees of significant damage. No one died; no one was injured. Fewer than 500 barrels of oil--out of a daily capacity of 750,000 barrels--were spilled -- and nearly half of that was skimmed up by recovery crews. No measurable oil reached the Gulf's shores. Thousands of birds and fish and plants were destroyed by the hurricane itself, but those that survived it were unharmed by oil spills.

"We've had a number of hurricanes before," says Daniel Bourgeois, Regional Supervisor of Field Operations for the Interior Department's Minerals Management Service (MMS), the Interior Department agency charged with administering federal offshore mineral programs including natural gas and oil. "But none of the earlier storms caused the physical damage Andrew did.

Still, everyone was evacuated in plenty of time, and pollution was very limited because the shut-in devices and procedures worked."

"What we've seen is a demonstration of sound technology, engineering skill, solid safety and environmental standards by both government and industry, and care in the training of personnel," says Bob Stewart, President of the National Ocean Industries Association.

How could this huge, interconnected, fragile-looking network of structures and pipelines withstand one of the most devastating hurricanes of the century with so little damage? A storm that leveled nearly everything it touched on land, damaged fewer than eight out of every hundred offshore rigs in the Gulf, in many cases only slightly.

It wasn't mere good luck. Most modern structures were built with Hurricane Andrew, or the equivalent, in mind. "The industry," says Bourgeois, "has refined its planning to make sure that people are out and operations are buttoned up well in advance of a major storm. This minimized both pollution and personal injury."

Today's offshore structures are designed to resist even calamitous storms such as Andrew. This massive system is a closed one. Many components lie on the sea floor, out of sight and out of reach of the weather. Standard operations and systems are designed to shut in whole areas in the event of a massive storm and are backed up by automated equipment. These robotic systems can perform most emergency functions, including shutting down, without human operators even being present.

The safety preparations and evacuation procedures are thorough: even one-time visitors are drilled on exactly what to do if an emergency comes up. Federal inspectors regularly conduct unannounced inspections and drills on individual platforms. Typically, some 300-400 inspections take place every month, and facilities that are not in compliance with their leases or with operating or safety regulations are shut down until compliance is reached. MMS presents annual safety awards which are highly prized by individual companies and for which those firms compete.

True, not all of the Outer Continental Shelf system in the Gulf survived the killer storm intact. Some older platforms, designed to resist "25-Year" storms, have decks some 35 to 40 feet above sea level. This would allow 45 - 55-foot waves (from their troughs to their crests) to pass under the rigs. That might seem like plenty. It wasn't enough for Andrew.

Most structures that succumbed were of this vintage--but even they let almost no oil escape.

Some 25 years ago, many companies raised their deck design specifications to meet "100-Year" storm levels: about 48 feet above sea level. In 1972 the Federal Government adopted this criterion as the official standard. Some modern platforms beat even that precaution, with decks at 60 feet or higher. At that level, a 72-foot wave will pass under the deck.

Tougher design specifications were proved out by the industry and adopted as standards by the government in the 1970s, as well. Stronger steel, new alloys and designs, better framing and joints, and pilings driven deeper (from 300 - 400 feet) into the sea floor have also helped insulate the system from hurricanes.

Advanced technology strengthens the system against weather, and helps isolate natural gas and oil from potential storm exposure. Computer-based systems with automatic backups can control all processes and equipment from central control rooms, and emergency shutdowns and communications can be conducted from auxiliary centers. Sensors can detect coming storms, stop production and secure all equipment.

All these processes and procedures are regularly reviewed by individual companies, industry groups and the federal government.

"MMS," says Stewart, "played a positive role in helping foster

the integrity of the structures, the relevance of the training and the effectiveness of our evacuation procedures."

Improvements to the system are constantly being developed; standards are regularly upgraded to make the network more secure.

Government and industry are taking lessons learned elsewhere in the world and applying them in American waters. It's the threat of hurricanes and other dangers, in fact, that has helped industry and government create what is probably the safest, most environmentally benign natural gas and oil production/delivery system on or near the continent.

All these safety procedures and systems, along with extensive plans to provide for the people who operate them, came into play as Andrew approached. Companies activated emergency checklists, evacuated non-essential personnel and began preparing to shut down. Workers remaining behind maintained production until the nearing storm signaled them to shut down production manually and evacuate to shore. A few structures even kept producing after all hands were away, later shutting down when operators issued remote commands as the storm came closer.

The shore-bound people didn't just wait the storm out; teams were organized and made ready to head back out on the hurricane's heels, to perform extensive inspections and assure that no hidden damage might result in unexpected spills or accidents when production resumed. After initial helicopter surveys for possible damage, divers and remotely operated vehicles went underwater for closer looks at submerged structures and systems.

Much of the period before the return to near-normal production was spent in these inspections, rather than in repairing actual damage. Of the 13 billion cubic feet per day of natural gas -- and 750,000 barrels of oil -- that were shut in during the storm, 95 percent was back on-line in less than four months.

But the precautions didn't end with the immediate evaluations. In succeeding months, federal regulators mandated extensive underwater inspections of all facilities in or near the storm's path. Most companies had already started this work even before the federal instructions were issued.

It's all part of a continuing process of development. Every new piece of data goes into the equation. "This storm itself gave us a benchmark. It provided a sort of laboratory," says Bourgeois. "It let us prove out our procedures and systems in a real, 100-Year storm." The results will provide some directions for designers in building even stronger offshore facilities, he said.

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It's been two dozen years since the last major oil spill from an Outer Continental Shelf platform. But the images of that event, the 1969 Santa Barbara spill, are still strong in the minds of the public, the industry and the federal government. Efforts to make sure such a catastrophe doesn't happen again have been monumental, ongoing and successful.

The Santa Barbara spill taught a costly lesson. But it spawned an ethic in which companies and regulators make their first priority the improvement of practices to insure safety, both for the people who work offshore and for the environment around them.

The people who operate and regulate the offshore system consider complacency to be the biggest enemy of the system, its people and the environment. They know that, as soon as someone says, "A disaster can't happen here," it will happen.

They're determined not to let it.

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