NOAA REPORT

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Delaware Is Storm Ready

—By Marcie Katcher

On Oct. 2, Delaware became the first state in the continental United States to achieve "Storm Ready" status, a designation that the state has taken specific steps to prepare for severe weather and dangerous storms.

With the Atlantic Ocean and Delaware Bay to the east and Chesapeake Bay and the Appalachian Mountains to the west, weather can be both a friend and a foe to every Delawarean.

"I'm proud that Delaware has become the first state in the continental United States to become Storm Ready, with all three counties in Delaware and the City of Wilmington meeting the criteria for Storm Ready recognition," said Gov. Ruth Ann Minner. "That recognition can only mean one thing. Delaware can now serve as a role model for the rest of the nation. And that recognition is something that I, as the governor, am extremely proud of."

Joseph Miketta/NOAA

Wilmington, Del., Emergency Management Director George Giles (center) accepts Storm Ready recognition for the city from Delaware Gov. Ruth Ann Minner and National Weather Service Director Brig. Gen. David L. Johnson, U.S. Air Force (Ret.).

According to Gary Szatkowski, meteorologist in charge of the NOAA Weather Forecast Office in Mt. Holly, N.J., which covers Delaware, "The important factors that enabled Delaware to become Storm Ready were strong government leadership, a sense of focus and an ability to build partnerships. Building partners turn out out to be most important, [along with] improved communications at all levels of government agencies involved in the program."

The move to Storm Ready status for Delaware began in 2003, when emergency management officials in Delaware met with Weather Service officials in Mt. Holly to discuss the Storm Ready program.

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New Key West Weather Office Withstands Wilma

—By Dennis Feltgen

When tropical depression #24 strengthened Oct. 17 into tropical storm Wilma, the season's twenty-first named storm, its presence in the northwest Caribbean Sea signaled there was a good chance another hurricane would take aim at the Florida Keys.

Yet even as Wilma intensified into a category 5 hurricane, the strongest hurricane in terms of air pressure ever measured in the Atlantic basin, the staff of the NOAA Weather Forecast Office in Key West, Fla., felt uncharacteristically safe.

Just three weeks earlier in this record hurricane season, the forecast office staff had moved into its new facility on White Street near the center of the island, a building unique to the fleet of Weather Service forecast offices. It is reinforced to withstand a category 5 hurricane, with winds up to 165 mph, and has a safe room for winds up to 250 mph. It also sits high enough above sea level to withstand a category 5 hurricane storm surge.

"[During the storm] we were able to remain mission-focused, rather than be concerned about our personal safety," said Jon Rizzo, the Key West warning coordination meteorologist.

Since 1957, the Key West weather office had been located at

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Hurricanes Reveal Clues to Researchers

—By Jana Goldman

While Hurricanes Katrina, Ophelia and Rita swept paths of destruction across the Gulf of Mexico this past hurricane season, they also served as natural laboratories for NOAA Research scientists in Princeton, N.J., and Seattle, Wash., before, during and after the storms.

"While this has been a very destructive hurricane season, we gained valuable insight into further understanding and predicting hurricanes and other tropical weather," said Frank Marks, director of the Hurricane Research Division of NOAA's Atlantic Oceanographic and Meteorological Laboratory in Miami, Fla. "The information we gathered from these storms will help us fine tune our track forecasts as well our ability to let people in the coastal regions know how strong these storms might be and how much precipitation to expect."

Michael Black/NOAA

A NOAA P-3 aircraft flies a research mission into Hurricane Ophelia.

A hurricane computer model developed at NOAA's Geophysical Fluid Dynamics Laboratory in Princeton, one of four used by NOAA's National Hurricane Center, accurately forecasted Katrina as early as the Friday morning before the storm made landfall.

"The computer guidance at the Weather Service was exceptionally good," said Morris Bender, a GFDL research meteorologist. "This helped to save many lives."

Hurricane researchers flew numerous missions for both research and operational purposes into and around all three storms, using the NOAA P-3s and the NOAA G-IV Gulfstream jet.

"We send back data that is used by the National Hurricane Center for the forecasts and warnings, as well as for research purposes," Marks said. "So far this season, we were able to successfully conclude our intensity forecasting experiment, refine our use of the Stepped Frequency Microwave Radiometer—a device that measures the surface wind field of a hurricane—and perform 30 surface wind analyses during Katrina."

The experimental wind analysis field maps of the storms have been used by emergency managers in recovery planning.

Hurricane Ophelia offered the opportunity for the first and only three-plane research mission into any of the storms this season. Both NOAA P-3s and a Navy P-3 were sent into the storm.

As a part of the Intensity Forecasting Experiment, carried out by the Hurricane Research Division in partnership with NOAA's Aircraft Operations Center, NOAA's Environmental Modeling Center and the National Hurricane Center, researchers mounted the Stepped Frequency Microwave Radiometer on the wing of a P-3. The radiometer sent back data to the National Hurricane Center during Katrina that gave forecasters the information they needed to upgrade Katrina to a hurricane just before it made landfall in Florida on Aug. 25, maintain the category 4 status all through the day Aug. 28 and know what the surface winds were as it made landfall in Louisiana Aug. 29.

For the first time, the Hurricane Research Division provided real-time airborne Doppler radar observations and analysis. Improved technology allowed scientists aboard the aircraft to transmit data down to the Hurricane Research Division, which then sent it via the Internet to the Hurricane Center. Operational forecasters were then able to see, in real time, the radar-observed winds and precipitation patterns in the storms.

Helping in the aftermath of Katrina, AOML provided staff, equipment and expertise aboard the NOAA Ship *Nancy Foster* and the *R/V Cape Hatteras* to assess the oceanography and water quality of the Gulf of Mexico.

A series of oceanographic drifters was deployed in the Gulf of Mexico and more are planned. In conjunction with satellite data, models and the data collected by partner agencies, these data will permit NOAA to accurately assess any downstream risks posed to the state of Florida.

Help was also given from the West Coast. In Seattle, NOAA's Pacific Marine Environmental Laboratory's thermal mapping and analysis group assisted with oil spill trajectory forecasting. PMEL scientists used live-access server technology to provide Internet access to Gulf Coast nowcast/forecast model outputs generated at Texas A&M University.

One of the challenges to researchers has been trying to learn

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Michael O'Donnell

Tim Osborn.

Tim Osborn Is the NOAA Employee of the Month

—By Ben Sherman

If ever one person epitomized NOAA in a region, in the parishes of southern Louisiana that person would be November Employee of the Month Tim Osborn.

Officially, Osborn is the eastern Gulf Coast navigation manager for the Customer Affairs Branch of the Navigation Services Division of the Office of Coast Survey within NOAA's National Ocean Service. Just ask NOAA constituents in Louisiana and you'll quickly find he is much more.

"I can cite a multitude of reasons on how important Tim is to parish officials in Louisiana," said Windell Curole, general manager and assistant emergency preparedness director for the South Lafourche Parish Levee District. "Tim is incredibly valuable to us. He makes all the various aspects of what NOAA can do readily available. During the past few months with Katrina and Rita, he made it a point to track down every key official and offer them the latest information on the storms both before they hit and afterwards."

Throughout and beyond the passage of hurricanes Katrina and Rita, Osborn coordinated and provided logistical support for NOAA's navigation response teams, aerial imagery acquisition, tide and water level operations and storm surge monitoring.

Osborn's job has included coordinating NOAA's navigational and waterway response efforts both this year and last following the hurricanes that hit Florida, Alabama, Mississippi and Louisiana.

Osborn played a key role in making sure NOAA was ready to participate in the major interagency effort to ensure that navigational areas affected by the hurricanes were clear of obstructions and debris. Less than two weeks after Katrina made landfall, ports along the Gulf Coast and channels on the Mississippi River were once again safe for ship traffic.

Osborn's proactive efforts in the region combined with his knowledge of the various port communities provided the proverbial "grease to the tracks" that made NOAA's response one that came quickly, was on target with the agency's mission and set an example to follow.

"Tim's response to two of the most destructive hurricanes to hit this nation went far beyond expectations," wrote Office of Coast Survey Director Roger Parsons in Osborn's employee of the month nomination. "For six continuous weeks Tim was NOAA's eyes and ears along the devastated Gulf Coast."

Osborn linked the key local government and industry people with NOAA in order to set survey priorities and ensure that the logistical needs of NOAA's navigation response teams were met. He

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Russ Potter, Jr.

Heather Hirzel.

Heather Hirzel Is the Team Member of the Month

—By Dane Konop

November Team Member of the Month Heather Hirzel considers herself a problem solver who enjoys working with numbers. As an accountant for Ernst and Young, Hirzel works under contract to both the real and personal property branches of the Office of the Chief Administrative Officer, helping NOAA financial managers keep track of millions of dollars of government property.

A couple of years ago, NOAA was having problems accounting for both real and personal property assets, which include everything from personal computers to ships. Monthly personal property reports required of property managers in the field were not user friendly, resulting in omissions, inconsistencies and inaccuracies. On the real property side of the ledger, which broadly includes large things like buildings that cannot be moved, NOAA financial managers were

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Focus On...

NOAA Opens Great Lakes Maritime Heritage Center at Thunder Bay, Mich.

Adam Jurkowski/STC Images

NOAA, federal, state and local officials join developer Jeff Konczak and explorer Robert Ballard for the ceremonial opening of the Great Lakes Maritime Heritage Center in Alpena, Mich.

Adam Jurkowski/STC Images

In the center, visitors can view historic photos, paintings and scale models of ships that once plied area waters.

—By Walter Bonora

On a turbulent November morning in 1913, the steel-hulled ship *Isaac M. Scott* sank in Lake Huron, taking with it the entire crew of 28. The ship was just one of 11 ships that sank during the "Great Storm of 1913," considered one of the most devastating storms of the 20th century to pound the Great Lakes.

Resting in what has become known as "Shipwreck Alley," *Isaac M. Scott* is just one of more than 160 known shipwrecks in Lake Huron's Thunder Bay off Alpena, Mich.

To preserve and tell the story of *Isaac M. Scott* and scores of other ships that once plied the waters of the Great Lakes, NOAA and the state of Michigan have teamed with a local developer to open a state-of-the-art visitor center and research facility in Alpena.

The 20,000-square-foot Great Lakes Maritime Heritage Center celebrated its grand opening in September. NOAA and other government officials joined more than a thousand local residents and other guests for the event.

Following the opening ceremony, visitors toured the new facility, which features shipwreck exhibits, an archaeological conservation laboratory, an education resource room and a 90-seat auditorium.

Soon, Great Lakes Maritime Heritage Center visitors will be able to take virtual tours of shipwrecks in Thunder Bay and national marine sanctuaries throughout the United States via live video feeds piped into the facility.

Painted in NOAA colors, the facility serves as the new headquarters of Thunder Bay National Marine Sanctuary—a 448-square-mile preserve managed by NOAA and the state of Michigan that is

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aimed at protecting a wide array of underwater cultural resources, including but not limited to shipwrecks. The center will also be a regional resource for the study of Great Lakes maritime history and underwater archaeology, assisting nonprofit organizations and state and other federal agencies.

"This is an incredibly exciting time for the sanctuary and the state of Michigan," said Jeff Gray, manager of the Thunder Bay sanctuary and the Great Lakes Maritime Heritage Center. "The center will offer resources to visitors, maritime historians and researchers that are unparalleled in this region."

The center is located at a former paper mill, an historic property that was renovated with an initial investment of $2.5 million from NOAA, made available with the assistance and support of U.S. Sen. Carl Levin.

Rebuilt with sustainably produced and energy-efficient materials, the facility is the anchor of a major redevelopment of the Alpena river front.

Adam Jurkowski/STC Images

A maritime heritage center visitor examines a photomosaic of one shipwreck that lies within the Thunder Bay National Marine Sanctuary.

"This center renews our sense of belonging," said Joel Bauer, an attorney and fifth generation Alpena native. "Alpena is a blue collar town with its roots in logging and then cement making. Over time, economies change, people lose jobs and are forced to move elsewhere. Many of us are tied to this community, and this center not only restores pride in our town, but gives us something positive to look forward to."

Bauer joked that Alpena was once the last place anyone would want to visit. "But that has changed because of the sanctuary designation," he said. "And together with the visitor center, the sanctuary is truly a unique place in the world."

For Betty Krueger, an Alpena native and sanctuary volunteer, opening the center was an exclamation point to years of hard work and countless hours to get the sanctuary designation. "First, my beloved Thunder Bay was named a sanctuary in 2000, and five years later, the visitor center opens," she said.

"Thunder Bay is an impressive example of NOAA's ability to engage a community and move out in a big way to dramatically affect how the Great Lakes region views and participates in the preservation of our country's maritime heritage," National Marine Sanctuary System Director Daniel J. Basta said at the opening. "People here have a strong bond with their community, and the Great Lakes Maritime Heritage Center can be a window into what the future may hold."

Adam Jurkowski/STC Images

Visitors can also view shipwreck artifacts and watch real archaeologists at work examining and documenting artifacts in the archaeological conservation lab.

Storm Ready

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"There are six general criteria for cities and counties to fulfill in order to be designated Storm Ready," said I. Ross Dickman, deputy chief of the Meteorological Services Division of the Weather Service's eastern region and a member of the Storm Ready corporate board.

To achieve Storm Ready status, a community must establish a 24-hour warning point and emergency operations center. It must have multiple ways to receive severe weather warnings and forecasts and to alert the public. It must create a system that monitors weather conditions locally. It must promote the importance of public readiness through community seminars. And it must develop a formal hazardous weather plan, which includes training severe weather spotters and holding emergency exercises.

One of the first challenges faced by Delaware's state emergency management agency was the need for additional surface observations. The Delaware Emergency Management Agency worked with Delaware's state legislature to get funding identified and appropriated for the Delaware Environmental Observing System, a network of over 40 meteorological and hydrologic monitoring stations which feed data in real-time to all the need-to-know agencies throughout the state. The data are also sent in real-time to the Weather Service office in Mount Holly for display in the Advanced Weather Interactive Processing System and to NOAA's Middle Atlantic River Forecast Center for use in its multi-sensor precipitation estimation programs.

Data from these stations are also available on the World Wide Web.

"As the nation's environmental steward, NOAA encourages and endorses this kind of environmental monitoring system over the Internet because it provides situational awareness to every citizen as threatening weather approaches," said the Weather Service's Eastern Region Director Dean Gulezian.

To build a communication infrastructure among federal, state and county agencies, the Weather Service worked with the Delaware Emergency Management Agency to create a state-level Storm Ready board.

In addition to Weather Service representatives, members on the board included emergency management officials from each of Delaware's three counties, as well as the city of Wilmington, state-level emergency management officials, the Delaware Department of Natural Resources and Environmental Control, the Delaware Department of Transportation, the Delaware Geological Society and the Delaware State Police.

The board worked with each of the three counties and Wilmington to have applications prepared in a timely and organized manner so that they could all be submitted and approved at the same time.

"During the Storm Ready site visits to each jurisdiction, discussions were held with 911 personnel to explain their role in the communication process and to express appreciation for the fine job they've done over the years in relaying hazardous weather information to the National Weather Service," said Joe Miketta, warning coordinator meteorologist at Mt. Holly.

By the summer of 2005, all the necessary criteria for being declared Storm Ready were met and, amidst much fanfare, a ceremony was held at the state's annual Coast Day celebration in Lewes, Del., with attendees that included Sen. Tom Carper, Gov. Ruth Ann Minner, Delaware Department of Safety and Homeland Security Secretary David B. Mitchell and National Weather Service Director Brig. Gen. David L. Johnson, U.S. Air Force (Ret).

As this year's events along the Gulf Coast have shown, a major weather event can overwhelm a local community or even an entire region. As the partnership threads of Storm Ready continue to multiply, larger groups at the multi-county and state level are taking a closer look at the Storm Ready program throughout the country.

Storm Ready started in 1999 with seven communities in the Tulsa, Okla., area. There are now more than 960 Storm Ready communities. Hawaii became Storm Ready and Tsunami Ready earlier this year.

Hurricane Research

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more about what happens at the area near the ocean's surface, about 500 to 1,500 feet, a height that is too risky for normal aircraft to fly. Tropical storm Ophelia offered an opportunity for NOAA, NASA and Aerosonde North America to launch an aerosonde, a small, unmanned vehicle, into the storm as it hugged the Carolina coast.

After a 10-hour flight gathering and sending back temperature, pressure, humidity and wind speed data every half second in real time, the craft returned to its launch site on Wallops Island "in pristine condition," according to its manufacturer.

The Sept. 17 flight was the first-ever successful aerosonde flight into the core of a tropical cyclone.

"Using these vehicles will let us gather important data to improve our hurricane intensity forecasts without putting lives at risk," said Joe Cione, a NOAA hurricane researcher at AOML and lead scientist on the aerosonde project. "We hope this will be routine in the future."

Key West

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the Key West International Airport. It was directly across from the Atlantic Ocean, in a category 1 hurricane storm surge zone.

Brushes with this year's Hurricanes Dennis, Katrina and Rita produced storm surges from the south-facing Atlantic side, ranging from two to five feet. Each surge nearly surrounded the old office with seawater and debris. Water blew in under the front doors. The roof leaked, threatening critical weather computers. Off-duty staff slept intermittently at their desks or on the floor.

Key West meteorologist in charge Matt Stahan, had estimated the airport location would be in danger if it was struck by the full fury of a category 3 hurricane. "That meant the meteorologists might be running for their lives, instead of protecting the lives of everyone else," he said.

The new building made all of the difference. "No one was concerned about their safety, if they were going to flood or lose the roof. It made it much easier to concentrate on our mission," Strahan said.

Nor did anyone have to worry about the safety of their family. The building was constructed with additional space on the second floor for family members to stay during a hurricane, adding peace of mind to the staff. As Wilma approached, several staff members moved their families to safety there. Since bunk beds were not yet installed, air mattresses had to suffice.

On Saturday, Oct. 23, while Wilma meandered over the Yucatan and weakened to category 2, it was clear the hurricane's next target was south Florida and the Florida Keys. Wilma would also be strengthening on its way.

"Our first concern was the wind," said senior forecaster Mike Rapsik. "But when we looked at the SLOSH models, our greater concern became the surge coming in on the west side."

At 11:30 p.m. Saturday night, the Key West weather office warned of a five- to eight-foot storm surge on Monday morning over the north-facing gulf and bay side of the Keys, a rare occurrence there.

Several violent waterspouts were detected over the near-shore waters that evening. Again, thanks to the safety provided by the new forecast office, the staff was able to remain focused on its mission, rather than be concerned about evacuating as the worst of the storm came closer.

In the early morning darkness, as a strengthening hurricane Wilma was passing seventy miles north of the Keys, a three and half foot surge came up from the Atlantic side, spilling over South Roosevelt Boulevard into Key West airport, inundating its runways and terminal with seawater.

The upper air shelter, where weather balloons were being launched every six hours for hurricane support, flooded with three feet of water, destroying much of the equipment inside. The Automated Surface Observing System station near the building recorded an 83-mph wind gust, before failing just before 3 a.m.

But to those in the operations area at the center of the new forecast office, behind reinforced concrete walls and thick storm shutters on its windows, Wilma was barely detectable. Hurricane-force winds were tearing pieces of the roof from the school across the street, hurling them towards the weather office building. Only an occasional bang from this flying debris against the shutters provided any hint of the storm that raged outside.

Forecasters worked through the night, receiving and relaying the latest storm reports, thanks in part to another unique aspect of the building—the presence of emergency management personnel, including representatives of the Monroe County sheriff's office, Fisherman's Hospital of Marathon and the local tourist development council. Joining them were three soldiers from the Florida National Guard.

"By having emergency management here, the communication and coordination between agencies were instantaneous and excellent." Rizzo said. "Having key people from various agencies was immeasurable."

At 6:30 am, category 3 Hurricane Wilma made landfall at Cape Romano on Florida's southwest coast. The hurricane-driven winds over the Keys had now become northwest, sending the anticipated five- to eight-foot storm surge over the Keys from the Gulf of Mexico and Florida Bay.

Forecasters watched in awe from the safety of the lobby of their Key West office as the waters rose outside, flooding neighboring streets and homes. In less than an hour, Key West was 60 percent flooded, as the waters of the Gulf of Mexico met the waters of the Atlantic Ocean. But no water ever entered the new Key West Weather Forecast Office building.

By afternoon, the winds had eased and the flood receded. The homes of several staff members were damaged by wind and flood waters. But the staff and their families were safe.

"The staff has seen firsthand what hurricanes can do," Strahan said. "When it comes to forecasting storm surge, local forecaster experience is good to draw on."

Working in a safe building clearly made the mission easier for the Key West forecast staff, providing a prototype for future National Weather Service buildings.

Heather Hirzel

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having problems determining whether leased properties were operating leases or capital leases, which are generally for properties leased for long periods.

"As part of [NOAA's] audit process, we have to evaluate the value and other assets associated with our real property portfolio," said Roy Eckert, deputy director of the Office of Real Property Management in Silver Spring, Md. "Heather developed the lease determination worksheet that we use to evaluate lease transactions, which brings you to a conclusion as to whether that lease should be classified as capital or operating on NOAA's financial statement."

"She created for us a Swiss army knife of a lease determination worksheet," said Andrew Duran, director of the Office of Real Property Management. "No matter which way you want to structure the lease, this single determination worksheet will walk you through it. Other agencies are already asking for it."

"To me," Eckert said, "Heather excels in data manipulation, manipulating spreadsheets and large amounts of data."

"Not only that," Duran added, "I think she can represent these very complex things to a lay person. She's been able to take this idea from reading requirements out of regulations into something she could train people on by herself. We like her so much, we tried to hire her."

Although she only spends about one week each month at her NOAA office in the Silver Spring Metro Center complex, she makes the most of her time.

"She's productive every minute she's with us," Duran said.

"I think another key ingredient of her success is her ability to interact with others," Eckert said. "We really don't have a large Silver Spring staff. All of our folks are in the field and they're the ones out negotiating leases. Heather's developed a very solid working relationship with a lot of these individuals and has built a confidence level with them. They naturally go to her for feedback and technical support."

"She's also able to tailor her advice to that person," Duran said. "It's kind of almost magical to watch her do it."

Hirzel, who grew up in Brunswick, Md., a railroad and historic C&O Canal town along the Potomac River not far from Washington, D.C., didn't start out to be an accountant.

"First I was going to be a math major in college and I made it all the way through calculus 2–and I didn't like it anymore," Hirzel said. "So I went looking for the closest thing to math that wasn't math, and I found accounting."

She ended up getting her B.S. in accounting from Towson University in Towson, Md., in 1999. Like most accounting graduates, she said, she immediately found a job, with a small accounting firm, then moved to Ernst and Young, one of the "big four" national accounting firms. She's been working on NOAA accounts for about four years, and is now a senior account manager.

Hirzel calls auditing NOAA's books fun. "I meet very interesting people," she said. "Auditing is like puzzle-solving. It's a logic thing. How does this thing work? Why doesn't this work?"

Although she has other clients, she said she particularly likes working with NOAA.

"I just really like the people I work with, and it's never the same," she said. "And we get to find out cool things about satellites and ships and stuff."

Tim Osborn

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had already arranged for NOAA participation in several Gulf Coast state Office of Emergency Preparedness sites prior to this hurricane storm season, which paved the way for the navigation response teams as first responders to these devastated port communities.

The importance of the port towns of southeast Louisiana to the nation's energy supply was known to Osborn long before the storms hit, and he worked diligently with local officials to prepare for the possibility of storm disruptions.

"Tim was very instrumental in emphasizing the importance of having accurate elevations from which to base our plans," Curole said.

"Our port provides 75 percent of the Gulf of Mexico's oil and gas to the nation. For us, NOAA's elevation survey and hydro surveying work is critical. Likewise, as the levee manager, Tim's ability to relay information quickly was critical in making decisions concerning when to order evacuations, to close flood gates," he said.

As to being named employee of the month for his efforts, Osborn downplayed his role. "I was just doing my job," he said.

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