



AUGUST 25-30, 2017

Hurricane Harvey, Category 4 storm,

hits the Texas Coast and floods Houston. Thermal Energy Corporation (TECO) and Texas Medical Center were prepared and continued operation throughout the storm.

51" of rain fell in five days, a record for a single storm in the continental United States.

Designed for a 500-year flood plus 2 ft, TECO's footthick floodwall and floodgates held back the rising water in the adjacent Brays Bayou.

Texas Medical Center's perimeter berms, barriers and 3-ft-high floodgates with rubber seals held water back from campus.

Nearly 13% of the 78,000 MW capacity in ERCOT's* electricity generating grid experienced forced outages during the peak of the storm.

*Electric Reliability Council of Texas

TECO used its 48 MW combined heat and power system to run all of its own equipment, easing demand on the electric grid.

Floodwaters inundated and closed primary and secondary roads, including I-10, I-45 and US-59.

TECO's 35-member ride-out team was on site at its Central Plant before roads closed.

Texas Medical Center's ride-out team stayed on campus, monitoring conditions 24/7.

TECO 2017 Annual Report ALWAYS PREPARED

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Committed to care

Channeling energy

Nearly 300 students from Baylor

employees by helping them with

post-storm home cleanup.

TECO's Bruce Turner was in

charge of installing the company's

TECO's Scotty Walker was in charge

of pumping massive rainwater out of

the company's vaults, trap

TECO's 2017 system metrics

sq ft of space on the TMC

include serving nearly 21 million

boxes and manholes.

Connected

campus.

foot-thick floodwall in 2003 and

Holding the line

extending it in 2011.

In the trenches

College of Medicine freed up Baylor

Texas Medical Center is critical infrastructure for Houston, with its services in even more demand during emergencies.

TECO Board of Directors

TECO's nine board members and eight alternates represent its member customers, voting to invest in flood mitigation measures.

Protecting against all odds

Charlie Penland of Walter P Moore on how TMC campus institutions have invested in flood control to safeguard patients and research.

Empowering the team

The University of Texas MD Anderson's ride-out team exemplified caring as it made on-the-spot decisions with confidence.

Voice of experience

TECO's Larry Null has nearly seen it all, with experience helping him train the company's operators to handle storms.

Fuel for performance

Along with four assistants, TECO's Phyllis Sousley made sure supplies were ordered and ride-out team members were well-fed.

Reconciled

TECO's FY2017 financials report operating revenues over budget and operating expenses under budget. >> 23

To our customers and friends

Chairman Brad Howell and President and CEO Steve Swinson look back on Hurricane Harvey and TECO's ride-out success.

Connecting for good

Texas Children's Hospital has established and maintains vital community relationships that enable it to provide ongoing care.

TECO and the storm

Water in Brays Bayou lapped against TECO's floodwall, but TECO persevered, serving both customers and employees. >> 14

Keeping your cool

Keeping the chillers and boilers running is all in a day's work for TECO's Joey Garcia, who was part of its 35-member ride-out team.

Completed

TECO's fiscal year accomplishments included generating 100% of its own power during peak power demand periods.

The TECO Team

TECO's nearly 100 employees are Houston Strong. They are supported by key business partners.

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THE ENERGY BEHIND WHAT'S NEXT

Mission: Provide reliable and economical thermal services to the institutions of the Texas Medical Center.

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Bradley N. Howell

Chairman, TECO Board of Directors Chairman & CEO, Lodestar Logistics Representative, Texas Medical Center



Donald P. DeWalch

Vice Chairman, TECO Board of Directors Director, DeWalch Technologies Inc. Representative, Texas Children's Hospital

Philip D. Aldridge

Associate Vice Chancellor for **Business Development** The University of Texas System

Kevin Dillon

Senior Executive Vice President, Chief Operating and Financial Officer The University of Texas Health Science Center at Houston

Russ Korcuska

Vice President Facilities Engineering and Construction Memorial Hermann Health System

Ben Melson

Senior Vice President & CFO The University of Texas MD Anderson Cancer Center

Barry Nelson, Ph.D.

Vice President for Finance and Administration The Texas A&M University System Health Science Center

Bruce Phillips

Partner, PinPoint Commercial, LP Representative, CHI St. Luke's Health

Robert Ramirez

Associate Vice President Facilities Management and Construction Texas Woman's University







<< BOARD OF DIRECTORS

ALTERNATE DIRECTORS

Bill Bussman Texas Woman's University

Denise Castillo-Rhodes Secretary, TECO Board of Directors Texas Medical Center

Peter Dawson* Texas Children's Hospital

Michael Hatton Memorial Hermann Health System

Rayellen J. Milburn The Texas A&M University System Health Science Center

Spencer Moore The University of Texas MD Anderson Cancer Center

Dan Sharphorn, JD The University of Texas System

William "Wes" Stewart The University of Texas Health Science Center at Houston

* Retired March 2018









<< PRESIDENT AND CEO

Stephen K. Swinson, PE

President and Chief Executive Officer





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To our customers and friends in the Texas Medical Center and our energy industry colleagues

Hurricane Harvey is now well in our rearview mirror, but few of us will ever forget its impact on Houston and the surrounding communities.

All of us remember where we were when the rain began – and continued – to fall and how we came together to recover from an unprecedented natural disaster.

The actions of first responders, medical staff, city workers, neighbors, strangers and friends were nothing short of heroic. We were and remain, "Houston Strong."

But even before Hurricane Harvey had a name, it was on Thermal Energy Corporation's (TECO's) radar as a storm to watch. On Wednesday, August 23, 2017, we made the call: We would bring in our storm "ride-out team" Friday the 25th and settle in nonstop for the long haul.

We implemented our emergency preparedness plan, running through the checklist to ensure all was in order to maintain uninterrupted cooling and heating service to customers on the campus of the Texas Medical Center (TMC). It worked.

TECO's chilled water and steam flowed throughout the storm to all 20.7 million sq ft of space in customer buildings that include two Level I trauma centers, hospitals, and laboratories containing invaluable research projects where service failure is "not an option." There's no question that TECO's extensive planning and capital investments made that possible.

Without the floodwall and floodgates we installed in 2003, portions of our plant would have been under two feet of water. Without our 48 MW combined heat and power system, we wouldn't have been able to power all of our own equipment and not depend on the electricity grid. We recognize the visionary leadership of the board of directors that understood the need to secure system reliability and approved funding to invest in these vital projects.

As a result, we've adopted "Always Prepared" as the theme for our 2017 annual report, focusing on how TECO's employees, the Texas Medical Center and our customers prepared for and weathered Hurricane Harvey, a 1,000-year storm. While there are more stories than we have the room to share, we hope the pages that follow convey the sense of community and teamwork brought to bear in the face of a devastating situation.

TECO alone had 35 people on our ride-out team at our Central Plant for 132 hours straight – 5-1/2 days. They knew the enormity of their tasks and remained focused, even though their own homes and families were at risk. We salute their dedication!

The on-site operators maintained standard 12-hour shifts, and maintenance and distribution crews worked around the clock as needed. Support staff made sure fresh food was delivered before the storm hit. They stayed on site to cook everyone three nutritious meals a day and make sure beds and personal hygiene items were on hand.

Indeed 2017 was a challenging and momentous year, one that heightens our appreciation for all who have served TECO over the decades. As we move through 2018, we celebrate our 40th year - "TECO turns 40" – as owners of the chilled-water and steam system serving the Texas Medical Center campus.

We are honored to serve the many campus institutions that overcome the odds and rise above the storm each and every day, performing medical and research heroics that make a difference in people's lives and transform our world. We thank you!

Stephen K. Swimin

Stephen K. Swinson, PE President and Chief Executive Officer

Brod Howell

Bradley N. Howell Chairman





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Committed

Texas Medical Center

The stories about the Texas Medical Center and Hurricane Harvey are etched in our memories. The nurses who made their way to campus by kayak. The doctors who waded through knee-deep water to care for patients. The general surgeon who performed brain surgery in a life-ordeath situation. The dedication of doctors, nurses and support staff was unparalleled in the face of adversity, just as it is 365 days a year.

Since its founding in 1943, Texas Medical Center's commitment to excellence has grown along with its campus. Today TMC is home to 50 million sq ft of institutions providing medical care, research and education. It is the world's largest medical center, which makes its performance during Harvey even more remarkable. All institutions remained operational. No institutions were flooded. But that wasn't just by chance.

Highlighting its importance, the Texas Medical Center's first and only amendment made to its covenant with member institutions relates to flooding. A major storm in 1976 prompted the 1978 change, requiring that all member institutions abide by TMC's flood mitigation rules and guidelines.

"The reality is that Texas Medical Center itself must be considered critical infrastructure," says William F. McKeon, TMC's president and CEO. "Our facilities are caring for a sensitive patient population and conducting an enormous wealth of life science research. Plus, there's even more demand for our services during

emergency situations. That's why we have extensive flood mitigation plans in place. Together with our member institutions, we've invested more than \$50 million in flood prevention infrastructure." (See "Protecting against all odds.")

Ahead of Hurricane Harvey, TMC activated those plans, ensuring that everyone knew what to do and how to do it when the rain began to fall. TMC maintained close communication with member institutions and large external stakeholders, such as the City of Houston, Harris County, the Office of Emergency Management, and emergency response teams across the region. TMC participated in twice-daily calls with the City's mayor and senior leadership team to make sure all parties were coordinating their efforts.

When the City asked TMC to set up medical care for 12,000 displaced

residents temporarily housed at Houston Convention Center, TMC collaborated with Baylor College of Medicine to provide medical personnel and everything from Band-Aids to diabetes medication.

"There is so much that went right, and we're grateful," reflects McKeon. "But we learned some valuable lessons. One is that we need to find a way to make the campus more accessible for personnel, patients and supplies. Do we need to change our street infrastructure? Do we need large vehicles or even water transportation? That's what we're looking at now. We will further refine our preparations. You never know when the next storm will hit."

Below: William F. McKeon is responsible for driving strategic, operational and programmatic initiatives across the Texas Medical Center's member institutions.

There is so much that went right, and we're grateful. ...But we learned some valuable lessons."

Texas Medical Center / Nick de la Torre

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Texas Children's Hospital / Allen S. Krame

to care

>> Above: Medical professionals were a part of ride-out teams throughout the Texas Medical Center, staying multiple nights before heading home.

Right: Some area roads became impassable during Hurricane Harvey.

Below: Reflecting TMC's mission, the TMCx accelerator was built to support innovative medical start-up companies by providing legal advice, regulatory guidance and more.





Texas Medical Center

- "Thermal Energy Corporation is a treasure, cooling and heating our campus buildings to help us sustain life. It is a cornerstone of how the Texas Medical Center operates. It is truly that important. The company goes out of its way to provide uninterrupted service. It stood strong throughout Harvey and that's a real marvel of engineering, planning and investment.
- " TECO President and CEO Steve Swinson was on campus during the storm. It was a blessing to know he was there. That's the spirit of TECO. It makes us even more enthusiastic about working with Steve and his colleagues to serve new development on campus. Although it means some streets have to be excavated to add chilled-water and steam pipes, the expanded system will be a huge return on investment for everyone. The more institutions that use TECO's system, the more efficient it becomes. It's an integral part of our innovative ecosystem, a great platform for the future."

William F. McKeon President and Chief Executive Officer Texas Medical Center

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When Charlie Penland scans the Texas Medical Center skyline, he sees more than just buildings. That's because he knows what lies behind their striking facades: an intricate flood protection system that ensures TMC-member institutions can withstand even the most intense natural disasters.

Penland's insight comes from decades of master planning and infrastructure design for the Texas Medical Center and its many institutions, including TECO. He and his colleagues at Walter P Moore have helped orchestrate flood system improvements and were instrumental in developing Hazard Mitigation Action Plans for many campus institutions. The plans kicked off more than \$50 million in infrastructure investments to protect against future catastrophes.

"Although campus institutions have always been aware of flooding potential, we started to get more inquiries about flood mitigation in the 1990s," says Penland. "There were new buildings connecting to the tunnel system, and institutions could see the flood risk potential."

Texas Children's Hospital was the first to complete tunnel submarine doors, just

before Tropical Storm Allison hit in 2001. They made a difference: The hospital was relatively unscathed by the storm.

The rest of campus felt Allison's wrath, and by some estimates, over \$2 billion in research was lost. In a timely turn of events, the storm turned out to be a data collection "windfall" for the engineers in the midst of flood protection planning. They scrambled to take high-water marks during the storm and recalibrate their strategies to incorporate new data.

Now each institution has a flood plan tailored to its unique situation. but coordinated with one another. Many have added flood doors and gates and



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collaborate in a Flood Management Group under the guidance of the Texas Medical Center, acknowledging their interdependence and the need for flood system protocol.

says Penland. "But planning involves a fine balance. You have to assess risk tolerance and determine what level of preparedness - and investment is appropriate. Under the Federal Emergency Management Agency's direction, we plan for a 500-year flood event and probable maximum precipitation. Although the campus held its own, Harvey was still out of the realm of anyone's imagination. It's proof that you have to plan for conditions that you don't think you'll ever see."

Left: Texas Children's Hospital commissioned the first tunnel submarine door on campus in 2001

Hurricane Harvey represents the only known storm to clearly exceed probable maximum precipitation (PMP), according to meteorological analysts from MetStat Inc. As defined by the National Weather Service, PMP is the theoretically greatest depth of precipitation for a given duration that is physically possible over a given storm area at a particular geographical location at a certain time of the year.

against all odds

Texas Medical Center / Kenzie delaTorre

Walter P Moore

Charlie Penland, PE, LEED AP

Walter P Moore

Senior Principal, Director of Civil Engineering

Since 2002, the Texas Medical Center and its member institutions, suppliers and government agencies have invested more than \$50 million to transform the campus into a model of storm preparedness:

- Formed Texas Medical Center Flood Management Group to protect inter-institutional tunnel system from flooding.
- Constructed exterior perimeter floodwalls, berms and barriers.
- Updated TMC/Rice Flood Alert System that monitors area rainfall, Brays Bayou water level and storm surge and provides early flood-warning predictions.
- Installed major drainage outflows to Brays Bayou.
- Widened Brays Bayou to collect excess water.
- Improved storm drainage on area streets.
- Virtually stopped ground subsidence on campus by coordinating with city of Houston and Harris Galveston Subsidence District.
- Installed watertight flood doors and floodgates.
- Included TMC in Houston's and Harris County's annual hazard mitigation plans.
- Built two backup substations to support CenterPoint Energy's Grant Substation that supplies electricity to TMC.
- Relocated electrical equipment, lab animals and research experiments from basements to upper floors.
- Built floodwalls and gates around TECO's Central Plant and combined heat and power system supporting uninterrupted chilled-water and steam service.
- Included pedestrian skybridges in construction plans.
- Constructed cell towers on several parking garage roofs to improve communications.

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Connecting

Texas Children's Hospital

When Pete Dawson and Texas Children's director of security saw a 40-inch carp swimming in the intersection of Bertner and Braeswood Boulevard August 26, they did a double take.Yes, it was a big fish. And yes, Hurricane Harvey had produced enough rain to significantly change normal water flow in local bayous! "It's so important to have solid person-to-person relationships in place with contractors and others in the community," says Texas Children's Bert Gumeringer, vice president of Facilities Engineering & Support Services. "It's especially useful during trying times. You know they have your back. You can pick up the phone, and



Dawson, then senior vice president of Facilities Services for Texas Children's Hospital, was scouting accessible routes to the Texas Medical Center campus during the storm. With medical staff in place, the hospital was open but would need supplies as the unrelenting storm grabbed hold of Houston.

During the storm, Texas Children's connected with the Air National Guard, which airlifted the needed supplies by helicopter. Relationships made it happen. they'll do whatever they can to come through for you." The hospital even has agreements in place for 18-wheel water tankers to connect to its buildings if the water supply is contaminated.

Maintaining connections is just one way Texas Children's stays prepared for manmade and natural disasters. It was the first institution on campus to complete "submarine" flood doors to protect against flooding just before Tropical Storm Allison in 2001. Since then, more flood doors have been installed in the campus tunnel system and coordinating their operation is key. Once the doors are closed, so is access to and from other institutions, so everyone must be notified when the doors will be activated.

"A great deal of thought and effort goes into getting prepared, whether it's handling flood doors or preparing to have staff stay for the duration," reveals Gumeringer.

Left: Texas Children's Hospital's mission is to create a healthier future for children and women throughout the global community.

"Our Risk Management Office leads the way, and preparation is embedded in everything we do. People understand what their roles are and what's expected of them. The logistics are well thought-out. How do we care for patients' families on site? Where are staff going to sleep? We need to be in a constant state of readiness."

Texas Children's has a Logistics Command Center at its Texas Medical Center location that is activated to coordinate infrastructure issues during emergency conditions. Staff recommend when specific actions should be taken. "At our TMC location, we don't have to worry about getting chilled water and steam from TECO," says Gumeringer. "We're confident we'll get the service we need. TECO gives us that added level of confidence that lets us concentrate on our core business, caring for children."

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>> Right top: When conditions allowed, helicopters transported supplies to members of Texas Children's ride-out team.

Right bottom: Members of Texas Children's ride-out team met regularly to exchange information and stay the course during the storm.

Below: Bert Gumeringer headed up Texas Children's Hospital's Logistics Command Center during Hurricane Harvey.

forgood

Visionary Leadership.

Texas Children's Hospital leaders describe it as an "aha moment." In the 1990s, longtime Texas Children's trustee George A. Peterkin Jr. proposed the hospital install submarine doors to protect it from flooding. The costs were going to be considerable, and purchasing new medical equipment instead was tempting. But Peterkin told his fellow trustees that having new instruments and machines wouldn't matter if they were eventually under water. He emphasized that Texas Children's needed a firm foundation, sturdy infrastructure. The trustees agreed, and the doors were installed. Their return on investment? According to Bert Gumeringer, incalculable!

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"Our Risk Management Office leads the way, and preparation is embedded in everything we do."





Construction Continued.

Before Hurricane Harvey descended on Houston, the contractor building Texas Children's new 19-story Legacy Tower expansion battened down the hatches. The facility came through with flying colors, but a new challenge emerged: It was difficult for workers to get from their homes back to the job site once the storm passed. By September 1, the work force was back up to 85%, but it was a slow return to full capacity. While the contractor did its best to get the project back on track, the disruption was yet another unexpected consequence of Harvey. Now close to completion, the Legacy Tower will open in two phases: The lower tower floors housing pediatric intensive care units, operating rooms and radiology will open in May 2018. The Heart Center will move into the upper tower floors in September 2018.

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Channeling

Baylor College of Medicine

Tropical Storm Allison took its toll on Baylor College of Medicine in 2001, destroying nearly \$300 million in research, including a 25-year-old breast tumor bank vital to advancing cancer treatment. But Baylor - an education, research and healthcare institution has since survived and thrived and now serves as a model of grit and resilience.

"When we saw Harvey coming, we knew we were ready," says Paul Klotman, MD, Baylor's president, CEO and executive dean. "After Allison, Baylor adopted a whole new philosophy on how to keep water from breaching our facilities. We installed major pumping systems, put a floodwall in place, installed 52 flood doors and moved our generators up from the basement. We now know exactly what to do when, double- and triple-checking our procedures. Harvey showed us it works."

Claire Bassett, vice president of Communications and Community Outreach, heads Baylor's crisis response efforts, coordinating with leaders of three ride-out teams: facilities, security and animal care. Animal care is a significant responsibility, adding a layer of complexity to ride-out efforts. Baylor's research department regularly conducts drills to confirm how much food and water must be kept on hand. And when a storm approaches, researchers are instructed not to start new experiments, just as hospitals put elective surgeries on hold.

"We had 52 people on our rideout team," reports Klotman. "What we didn't expect is the number of students who spontaneously arrived on site to see if they could help. While we appreciated their energy, they aren't licensed to practice medicine,



so they couldn't assist with patient care. Instead, we directed them to help Baylor employees at their homes so our trained professionals could come to work. Nearly 300 students made a difference in recovery efforts and established valuable relationships with Baylor employees." It was such a success that Baylor has continued the volunteer program.

Baylor also established an emergency relief fund, raising close to \$1 million in the first week. It dispensed the funds to employees in need who provided confirmation of their losses. Employees unaffected by the storm could donate their vacation time to other employees following institutional guidelines.

"Because of our preparation and dedicated staff, we were seeing patients again just days after the storm hit," says Klotman. "The first day, 18 made their way in! But soon there were 1,800 patients a day, ramping up to our normal 2,500. Clearly, Baylor's Allison and Harvey experiences couldn't be more different. I commend our ride-out team. They do it better than any group I've seen. If there was another Hurricane Katrina, I'd send them in to handle the storm, and they'd do it well."

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Left: On site during the storm, Baylor's Dr. Paul Klotman provided guidance and encouragement to ride-out team members.

Baylor College of Medicine

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Shelter from the storm.

As part of its community service outreach, nearly 100 Baylor pediatricians, family medicine and emergency doctors, and psychiatrists helped staff Houston's George R. Brown Convention Center, which served as a primary shelter during the hurricane. The psychiatrists stayed on board two additional weeks to help displaced residents cope with their losses.

Below left: Baylor medical students helped Baylor employees get back to work by helping with storm cleanup.

Below center: Water came right up to Baylor's front steps during the height of the storm.

Below right: It was important to periodically check water levels to ensure all precautionary measures taken were holding.



energy





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" TECO's performance during the storm was invaluable to Baylor. Without reliable chilled water and steam, research would be lost, and our lab operations would be significantly impacted. Lack of climate control would affect our patients, employees and research animals. And without chilled water, our freezers, cold rooms and computer and IT facilities would be compromised. Thankfully that didn't happen. Chilled water and steam came through without interruption."

Paul Klotman, MD President, CEO and Executive Dean Baylor College of Medicine



Above: Baylor College of Medicine maintains a research environment that fosters innovation, collaboration, and contribution to improved health care.



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Empowering

The University of Texas MD Anderson Cancer Center

You can definitely say you're prepared when you have 18 incident-specific emergency plans in place that account for bad weather, fires, acts of violence and more. That was the case for The University of Texas MD Anderson Cancer Center when Hurricane Harvey took center stage in Houston, Texas.

Knowing its cancer patients require uninterrupted care and treatment, MD Anderson rapidly set its plan in motion and opened its Incident Command Center (ICC) August 23. The ICC is led by an appointed incident commander who is supported by leaders focused on patient safety and experience, staffing, security and maintenance of all campuses, and coordinating operations and communications during the emergency.

"Leadership during the storm was exemplary," says Spencer Moore, vice president and chief facilities officer of Facilities Management at MD Anderson. "Everyone realized it was all hands on deck, and we were empowered to make on-thespot decisions that were in the best interest of our patients and employees. There was never any second-guessing or politics. Everyone helped, whether serving food or keeping an eve on the storm."

ICC tracked the volatile weather conditions through the institution's 24/7 Operation Center and held two to three briefings each

day. The Operation Center monitored flood conditions via the Rice University and Texas Medical Center Flood Alert System and weather through StormGeo and other independent web sites.

"Harris County Flood Control has significantly redirected Brays Bayou's water flow over the years, which helped all of us during Harvey," says Moore. "In reality, we felt we were in good shape when it came to flood prevention. We have a 47.5-inch-high floodwall and 79 flood doors that kept the hospital high and dry. We knew we

could depend on TECO, too. We were never without chilled water for air conditioning. It's a critical part of our infrastructure and maintaining quality patient care."

Communication was also key. Patients could check emergency alerts on MD Anderson's web site and customer portals. Staff received status updates on the bridge master notification system or by calling a special phone number to check the hospital's status. MD Anderson frequently checked in with workers not on site, too, asking

> if they were okay or if they needed help.

"When you go through a crisis like this together, you truly see the value of your team," observes Moore. "You experience the human side of an institution. Leadership showed extraordinary concern for patients and employees. It established the MD Anderson Caring Fund to help affected staff and gave personnel time to recover from their losses before returning to work. The response to the storm exemplified one of our core values: caring. That's important to carry forward as we move on from such a lifechanging event."

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Left: MD Anderson's vision is to be the premier cancer center in the world, based on the excellence of its people, its researchdriven patient care and its science.



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> Right: Spencer Moore is vice president and chief facilities officer of Facilities Management at MD Anderson, where he has worked since March 2012.

Below: Floodgates were put in place to protect MD Anderson's Main Building from high waters.

theteam

"When you go through a crisis like this together, you truly see the value of your team."





Allison's Silver Lining.

Five feet of water from 2001's Tropical Storm Allison changed MD Anderson. Post storm, the institution received more than \$30 million in Federal Emergency Management Agency (FEMA) grants to help prevent future storm damage. In the 16 years since Allison, MD Anderson has

- relocated its main campus emergency power equipment, water pumps and medical gas systems to the second floor, 45 ft above sea level and well above the 500-year floodplain;
- replaced its first-floor façade with a 47-inch concrete floodwall that includes aquariumgrade windowpanes;
- installed floodgates around the floodwall that automatically rise when filled with rainwater;
- compartmentalized the basement, sealing one area off from another with submarine-grade steel doors; and
- activated operational process improvements.

Harvey validated MD Anderson's investments, proving the institution's resiliency in late August 2017.

Harvey ride-out tally



538

HOSPITAL

PATIENTS

OUTPATIENTS 857 CHEMOTHERAPY PATIENTS AT AMBULATORY

TREATMENT CENTER

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1,200



300 PATIENT-FAMILY MEMBERS

35% of 21,000-MEMBER WORKFORCE SEVERELY IMPACTED BY STORM

ALWAYS PREPARED

13

Service status updates emailed representing 20.7 million sq ft of space.

Ride-out team receives regular reports from weather service and Rice **University** Flood Alert System.

35 ride-out team members stayed on site for 5-1/2 days.

More than 120 meals per day were served to ride-out team members.

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Team members pump water from stormwater lift station to ensure continuous operation.

> **Floodwall surrounding** plant holds back Brays Bayou floodwater, which peaked just under the bridges.

8.8 million

gallons of stored

chilled water available to feed system if chillers can't operate.

Tropical wave emerges off west coast of Africa.

Officially identified as Tropical Storm Harvey by National Hurricane Center.

Piping distribution

team works in the

rain, pumping water from vaults, valve pits and trap boxes.

Passes over Enters the Windward eastern Islands with Caribbean sustained wind speeds

of 40 mph.

Sea.

Weakens to a tropical depression. Peninsula. then a tropical

wave.

Strengthens Moves over to a tropical storm. heads

Texas.

Texas Gov. Gregg Abbott declares state towards of disaster

for 30 Texas

counties.

Strengthens to Category 1 hurricane with 80 mph winds.

Voluntary and mandatory evacuations declared in three Texas

counties.

Midnight: Strengthens to Category 2. Maximum sustained winds of 100 mph.

10 a.m.: Outer rain bands begin sweeping Texas coast.

14

Yucatan

48 MW combined heat and power unit able to power all of TECO's equipment off grid.

Hurricane Harvey dropped **ONE TRILLION GALLONS**

of water on Harris County, home to Houston and the **Texas Medical Center.** That's enough to cover the 1,800-sq-mile county with an average of 33 inches of water.

Floodgates locked in place at 12:25 a.m., Sunday, August 27, 2017.

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6 p.m.:

Intensifies to

Category 4.

Maximum

sustained

winds

130 mph.

2 p.m.: Strengthens to Category 3 hurricane. Maximum sustained winds 120 mph.

FEMA grants

10 p.m.: Gov. Abbott's Makes landfall request for on San Jose disaster Island. declaration.

5 a.m.: 7:05 a.m.:

124,538 in Tide gauge at Port Lavaca Nueces and measures 6.7 ft San Patricio above MHHW. counties without power.

Moves southeast towards Houston.

Stalls over Causes

catastrophic

flooding

throughout

southeastern

Texas.

Houston area

bringing more

than 50 inches

of rain in

spots.

Moves into

Gulf of

Mexico.



Gov. Abbott After five days of rain, entire Texas tornadoes and flash floods, sun finally shines in Houston.

activates

National

Guard.



Holding the line

Bruce Turner, PE, CPE

Vice President, Engineering

Joined TECO 1989

Just before Hurricane Harvey began pounding Houston with torrential rains, **TECO Vice President of Engineering** Bruce Turner arrived at the plant before daylight, part of the ride-out team reporting for duty.

He first made a round of the facility, ensured that pumps were working at the stormwater lift stations, and then closely monitored plant operations while keeping an eye on weather reports. Like his fellow ride-out team members, Turner was ready to lend a hand wherever needed to keep chilled water and steam flowing.

But most of Turner's flood prevention work began years ago. He has been in charge of many TECO engineering improvements designed to mitigate storm effects - and enhance reliability - during his 28 years with the company. Key among those projects:

the massive floodwall surrounding the Central Plant.

"We drilled 254 shafts, 30 feet deep, for reinforced concrete piers to support a floodwall around the plant," Turner recalls. "The wall was a major project that required great precision. We had to be extremely careful to avoid multiple electrical duct banks and city water lines. It was a \$5.5 million investment in our system's future that was well worth our effort."

Under Turner's direction, the one-footthick reinforced concrete floodwall was planned after Tropical Storm Allison, completed in 2003 and then extended when TECO expanded in 2011. He also oversaw installation and successful testing of the wall's floodgates, when his team filled adjacent temporary cofferdams with water to make sure they would hold.

And hold they most certainly have, for storms like Rita, Ike and the now-infamous Harvey and the 1,000-year flooding it unleashed.

The floodwall proved to be an essential part of TECO's emergency preparedness plan in 2017. After Harvey subsided, Turner dug out the wall's original design plans. Noting the storm's local high-water levels, he determined that some plant flooding would have occurred had the wall not been in place.

"There's no question that Harvey was our floodwall's first major test," Turner notes, "and it worked exactly as designed. It is greatly rewarding to know that a project I worked on made such a critical difference for our company and our customers."

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When TECO's Senior Vice President Larry Null looks back on the company's Hurricane Harvey performance, he can't help but reflect on his decades with the system and how it has grown and changed with the times.

He joined TECO in 1986, when the company had just one chilled-water and steam plant. Today its capacity has grown almost three-fold and boasts two interconnected plants and a combined heat and power system. Null has been a part of it all and was a member of TECO's Harvey ride-out team.

From the boiler room to the boardroom. Null knows TECO. He started as project engineer and has since worn the hats of engineering manager, plant manager, and president and CEO for 10 years before moving to his current position.

Null's broad background makes him invaluable, particularly in the case of emergency. "Back in 2001, Tropical Storm Allison - which no one predicted would cause such disastrous flooding - was the impetus to build a floodwall at our main plant site," he recalls. "We also hardened our

distribution system and implemented some new emergency policies and procedures."

When Harvey bombarded Houston. Null's influence was evident in the well-trained ride-out teams. All plant operators have participated in TECO's **Operator Training and Certification** Program, developed and managed by Null since 2009. Training covers daily plant operation, with a unit on flood protection procedures.

"A number of employees here for this storm weren't here during previous storms," says Null. "Since everything ran so smoothly during Harvey, I'm sure they have a hard time picturing what it took to get us to this point, the important upgrades we've made."

Null also notes that small details matter when you've got employees on site 'round-the-clock for more than five days: It's important to keep a schedule to help everyone stay on task. Plus, if the weather lets up and you need to send anyone out for supplies, it's important to have cash on hand, as electronic credit card systems are often out of service.

"I've been in Houston since 1949," says Null. "I've even had to evacuate family members during previous storms and come back to TECO. However, without a doubt, this storm produced the worst flooding I've ever seen. But we were ready."

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ALWAYS PREPARED 17

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"This sounds crazy, but for me the whole hurricane experience was 'just work.' Except for flood control, they were normal days on the job because we always have to stay on high alert, no matter the weather. It's what we do."



Keeping your cool

Operator

Joey Garcia

Joined TECO 2012

Hurricane Harvey lasted five days, and TECO's Joey Garcia knows exactly where he was on each of those days: serving as a plant operator on TECO's ride-out team.

Although he was primarily stationed in the control room, Garcia did manage to take an occasional look outside. and what he saw was unlike anything he had ever witnessed.

"It was quite a reminder about how Mother Nature runs this world, and we don't," he reflects. "TECO is right on Brays Bayou, and the water was very, very high, lapping up against our floodwall."

Garcia had contended with the force of Mother Nature before, as chief

engineer at another local energy facility during an ice storm and then Hurricane Ike. But the devastation wrought by Harvey was unparalleled.

Garcia and the rest of TECO's ride-out team were well prepared to respond. In advance of hurricane season, TECO had posted the list of ride-out team members - and his name was on it. Garcia and the other ride-out operators - six each on two shifts - had all received extensive flood control training, and they were ready to put it to work.

When Harvey hit, Garcia worked the day shift. "My job was to assist the shift leader and do whatever needed to be done," he explains. "I checked plant equipment, monitored the operating screens in the control room and, as needed, opened and closed

isolation valves and set up pumps to keep water out of the plant.

How does Garcia rate the Harvey ride-out team's performance? "Outstanding," he says, without hesitation. "We didn't lose any equipment. We kept the plant from flooding. The customers got the services they needed at the hospitals, and they didn't have to worry about getting chilled water or steam."

While the team can be proud of a job well done, Garcia characteristically took Hurricane Harvey in stride. "This sounds crazy, but for me the whole hurricane experience was 'just work.' Except for flood control, they were normal days on the job because we always have to stay on high alert, no matter the weather. It's what we do."

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In the trenches



As Hurricane Harvey's torrential rains kept falling, TECO Distribution Supervisor Scotty Walker and his crew kept pumping. Their job? Keep TECO's piping distribution system in operation - and serving customers throughout the storm. That proved to be no small task, as rain covered much of the system's underground piping in 100 vaults, trap boxes and manholes, posing a challenge for TECO's steam lines.

When a steam line is totally submerged, the steam inside condenses, requiring the plant's boilers to work harder to maintain steam load. Plus, the hot pipe can heat the rainwater, causing it to steam and boil, in turn damaging insulation and electrical systems in underground vaults.

With steam service vital to 16.1 million sa ft of customers for sterilization and other uses, lowering rainwater levels around the pipes was crucial.

Walker has been with TECO for more than nine years, previously working as a pipefitter and welder in the construction

"TECO rented a dump truck to ensure we could navigate flooded areas to get to our piping access points. First we headed to the areas that needed the most attention."

industry. He started at TECO as mechanic I and has moved up through the ranks to his current position.

"TECO is always ready for emergencies," states Walker. "Contingency is key, especially when facing such a catastrophic event as Harvey. TECO rented a dump truck to ensure we could navigate flooded areas to get to our piping access points. First we headed to the areas that needed the most attention. We wore rain gear, but under those tough conditions, we still got soaking wet. It was hard to stop and go to the plant for dinner, but we knew we needed to sustain our energy so we could keep going."

Walker normally heads a crew of four, but that number expanded

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exponentially during and after the storm, with nearly 30 handling poststorm repairs. Well into October. crews continued working seven days a week to restore vaults, trap boxes and manholes and repair electrical systems. All work was safely performed and steam and chilled water continued to flow.

"Before going on ride-out duty, I set up my family's generator at home, bought 40 gallons of gas and stocked them up with water and ice," reflects Walker. "Then I headed in to TECO. Working during Harvey was quite an experience. I've never seen anything like it. But service to our customers was never disrupted. That makes it all worthwhile."

"We were getting tired by day four. So a number of others jumped in to help. Everyone just did what had to be done. It was incredible. It really was."

Phyllis Sousley

Senior Buyer, Purchasing

Joined TECO 1991

Fuel for performance



As TECO's senior buyer in Purchasing, Sousley procures whatever products TECO needs to weather natural disasters. On Friday, August 25, she secured the final materials, working 6 a.m. to 2:30 p.m. at her "day job," and then donned an apron to become TECO's head chef during Hurricane Harvey.

"My family owned and operated restaurants, so heading up TECO's kitchen comes pretty naturally to me," says Sousley. "I knew we first needed to make sure the space was spotlessly clean and ready for food preparation. Nearly 40 ride-out team members

would be eating at TECO as long as Harvey lasted, so we had to be ready."

Sousley was joined by TECO's Marsha Ackman, Tim Reardon, Zhanna Kogan and Manuel Gamez, who all pitched in to make 120-plus meals a day for 5-1/2 days. The team followed Sousley's meal plan, which she developed to better feed the company's ride-out teams. The plan includes a 50-50 mix of fresh and canned/boxed foods, with every meal made from scratch. One recipe is her mom's own marinara sauce.

"Everyone needs proper sustenance," observes Sousley. "They all play an important role in keeping the system running. They deserve a great meal and a mental and physical break."

"But we found that even if there were 40 people, we had to cook for 80. They have big appetites! Our pantry was stocked to hold us seven days, but we did make a grocery run to be sure we had enough."

Ride Out Kitchen Team (left to right):

Tim Reardon, IV, IT Technician - Joined TECO 2016

Phyllis Sousley, Senior Buyer, Purchasing - Joined TECO 1991 Manuel Gamez, Building Maintenance Assistant - Joined TECO 2004 Zhanna Kogan, Project Engineer - Joined TECO 1983

Marsha Ackman, Engineering Administrative Assistant - Joined TECO 2002

Sousley and Ackman slept in a room next to the kitchen, rising each day at 4 a.m. to get breakfast underway. Those on kitchen duty found themselves on their feet 15-17 hours each day, as one meal prep and dining room cleanup rolled into the next. They finally crawled into their cots about 9 p.m., thinking about the day ahead.

"We were getting tired by day four," says Sousley. "So a number of other employees jumped in to help. Everyone did what had to be done. There was no bickering, no complaining. It was like a well-choreographed ballet. It was incredible. It really was."

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FY2017 Accomplishments >>

COMPLETED

Finance and Administration

- Exceeded budget expectations for FY2017 and presented FY2018 budget that was approved by Board of Directors.*
- Prepared accurate forward-year rate forecasts for institutions that need them for early-in-the-year budgeting.
- Maintained TECO's financial closing on third business day of the month.
- Completed FY2017 financial audit. There were no notable comments regarding FY2016 financial results, accounting methods, process or internal controls.
- Met on a regular basis with Board members outside of regularly scheduled meetings and met with senior executives for many customer institutions.
- Produced and distributed TECO's 2016 Annual Report, "On the Rise."
- Conducted 2017 customer satisfaction survey, with 100% of respondents replying that TECO's chilled-water and/or steam service met their expectations very well or well over the past year. (See below.)
- Conducted employee survey for 2017.

Operation

- Maintained uninterrupted system operation during Hurricane Harvey and the resulting flooding in Houston.
- Provided 100% chilled-water and steam reliability to customers.
- Generated 100% of own power during peak power demand periods recorded by Electricity Reliability Council of Texas (ERCOT), so TECO had zero power demand during these periods. TECO's CHP system eliminated the risk that chilled-water and steam customers could be negatively affected by power grid failure.
- Successfully followed Energy Policy initiated by Board of Directors in 2006, which helps TECO lock in fuel purchases at the lowest-possible cost.

- Continued Operator Training and Certification Program as scheduled. Three operators received or upgraded their City of Houston stationary engineer license.
- Maintained Workers
 Compensation Experience
 Modifier of 0.91, below the industry's average.
- Recommended 10-year funding increase for Major Equipment Replacement Program (MERP) and the insurance reserve fund, which was approved by Board of Directors. MERP ensures funding will be available for future equipment replacement as needed assuming normal equipment life cycles. By regularly allocating money to insurance reserve fund, TECO can raise deductibles and reduce insurance premiums.
- Completed FY2017 with only one recordable accident and no losttime accidents.
- Continued to operate and maintain The University of Texas Health Science Center's Research Park Energy Plant, South Campus. TECO remotely monitors plant operations 24 hours a day, and operators visit the plant daily, bringing UT Health significant economic savings and improved operational benefits.
- Continued to serve as point of contact for monitoring Metro Stray Current issues and their effect on institutions in Texas Medical Center.
- Successfully completed, on schedule and budget, capital projects to enhance performance, efficiency and reliability.

Customer Service

- Continued construction on pipeline projects to Houston Methodist Hospital, North Tower; Memorial Hermann Hospital's Hermann Pavilion II; and Harris Health System's Ben Taub Hospital - on schedule and on budget.
- Resolved issues between MD Anderson Cancer Center and other contracted TECO members regarding installation of heatrecovery chillers. The resolution validated TECO as the sole provider of chilled-water and steam service for contracted members.

90% of customer survey respondents indicated they were very confident or confident that TECO would supply uninterrupted chilled-water and/or steam service to their buildings during Hurricane Harvey.

95% of customer survey respondents indicated that TECO provided excellent service during the storm.

* Fiscal year September 1 - August 31

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<< FY2017 Metrics CONNECTED</pre>

TECO maintained uninterrupted system operation during Hurricane Harvey and the resulting flooding in Houston.

TECO's chilled-water system is interconnected between its Central Plant (Paul G. Bell, Jr. Energy Center) and South Main Plant, allowing chilled water to flow to customers from either plant if one is unable to function.

	Chilled Water	Steam		
CUSTOMERS				
Number of surface and	10	10		
Number of customers	16	16		
Number of buildings served				
Square feet served	20.7 million	16.1 million		
Energy sales	315,489,000 ton-hr	776,581 MIb		
ENERGY SOURCE	S			
Paul G. Bell, Jr. Energy Pla	ant – Central Plant			
Number of boilers, chillers/fu	els14 chillers .	7 boilers		
	electricity & natural gas	natural gas & diesel		
Thermal storage tank		n/a		
South Main Plant				
Number of boilers, chiller/fue	ls13 chillers/electricity .	2 boilers natural gas & diesel		
		-		
OPERATIONS/DISTRIBUTION				
Capacity	120,170 tons .	980,000 lb/hr		
	(including thermal storage)	(with heat-recovery steam generator & duct firing)		
Supply temperature	40°-43°F .	450º F		
Supply pressure	55-75 psi .	400 psi plant, 250 psi distribution		
Return temperature		150° F		
Water volume in system	12.4 million gallons .	n/a		
Steam pressure	n/a .	400 psi		
Piping type		Welded steel, Schedule 40		
	with coal/tar epoxy	with insulation		
Piping diameter	6 to 60 inches .	2 to 16 inches		
Piping distribution trench length				
(portions of the line have three pipes)				

Power

PAUL G. BELL, JR. ENERGY PLANT - CENTRAL PLANT			
Combined heat and power system			
Standby generation	14 MW		
SOUTH MAIN PLANT			
Standby generation	2 MW		

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Rates and Units

Fiscal year September 1 - August 31	FY2017	FY2016
CHILLED WATER		
Rate (\$/ton-hr)	\$ 0.2198	\$ 0.2229
Rate (\$/MMBtu)	\$ 18.32	\$ 18.57
Peak Demand (tons)	68,932	
Average Demand (tons)		
Load Factor	55%	
Peak (sq ft/ton)		
Production (sq ft/ton-hr)	0.06	0.06
Production (ton-hr)		
Cooling Degree-Days (3,510 normal) .		

Fuel Consumption (natural gas and electricity) MWh 253,074

STEAM

Rate (\$/Mlb)	\$17.03	\$ 17.75
Rate (\$/MMBtu)	\$ 14.18	\$ 14.78
Peak Demand (lb/hr)		
Average Demand (Ib/hr)		
Load Factor		
Peak (sq ft/lb)		
Production (sq ft/Mlb)		14
Production (Mlb)		1,121,470
Heating Degree-Days (1,081 normal)		
Fuel Consumption (natural gas) MMBtu	1,200,586	

TECO completed fiscal year 2017 with operating revenues 1.3% over budget and operating expenses 6.6% under budget. A majority of the expense variance was realized because (1) fuel and water costs came in 12.4% below budget due to operating efficiencies and (2) personnel costs finished 7.6% below budget. These and other favorable expense variances would have allowed for a customer rebate in excess of \$4 million (4.8% of budgeted operating revenues) in August 2017. However, due to an arbitration settlement and related expenses of \$4.15 million incurred during fiscal year 2017, no rebate was made.

TECO's income from operations in fiscal year 2017 was approximately \$9.0 million; total revenues in excess of expenses were approximately \$5.3 million. The \$3.7 million difference was the net result of the required reporting of an unrealized mark-to-market gain on an interest rate swap associated with the company's Series 2012 Bonds, unrealized losses on investments, and the arbitration settlement and related expenses.

TECO achieved its below-budget fuel cost without deviating from its energy policy, which provides fuel price stability so that rapid increases in fuel costs do not affect TECO's rates during a budget year.

The company met all of its planned cash, internally set financial, and debt covenant requirements for fiscal year 2017.

Revenue and Expenses

Fiscal year September 1 - August 31	FY2017	FY2016
OPERATING REVENUE	E	
Chilled Water Steam Other Total Operating Revenue	\$ 66,296,696 \$ 14,602,923 \$ 3,663,002 \$ 84,562,621	\$ 63,566,611 \$ 15,288,217 \$ 3,268,597 \$ 82,123,425
OPERATING EXPENSE	S	
Fuel Electric Gas Fuel Oil	\$ 7,789,395 \$ 7,211,549 \$ 96,032 \$ 60,488,662 \$ 75,585,638 \$ - \$ 2 9076,097	\$ 9,334,292 \$ 7,244,604 \$ 104,801 \$ 57,630,185 \$ 74,313,882 \$ (2,962,465) \$ 4 847.079
Non-Operating Revenue (Expense)	\$ 8,976,985 \$ 496,628	\$ 4,847,078 \$ (815,323)
Arbitration Settlement Expenses Arbitration Legal and Consulting Ex Arbitration Settlement Revenue in Excess of Expenses	penses\$ 1,586,182 \$ 2,566,572 \$ 5,320,857	\$ 156,614 \$ - \$ 3,875,141



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ALWAYS PREPARED

THE TECO TEAM

>> Marsha Ackman Craig Acree Priscilla Avila Heleva Bacchus Henry Barrios Jordan Baxter Rohn Benfield Chris Beroo Clarissa Brewster Julian Brewster Randy Brown Javier Castillo Fabian Charry Milton Cowan Jim Daniel, Jr. Charles Darden **Ruth Davis** Steve Del Toro Shawn Dennis Ryan Doucet Jackson Fay Kerry Fischer **Kyle Fridley** Manuel Gamez Jose Garcia Joseph Garcia Kevin Giblin Phillip Gonzales Vincent Gonzales Ram Goonie Todd Gryseels Manny Guerra

Daryle Hall Travis Hampton Mike Handorf Jess Harper Troy Hollin Steve Hyde Mycah Jewell Juan Jimenez Brandon Johnson Barbara Johnston Brady Jones Austin Kelly Zhanna Kogan Jacob Kruezer Nolan Lambert **Roger Lambert** Steve Lehr Antonio Lopez Jared Marish **Ronald Martens** Eddie Martinez Joel McCormick John McNeil Lamont McInnis Edegar Mendoza Charlie Michalak Dan Mitten Frederick Musil Philip Muzar, Jr. Stephen Nagy Larry Null Fidel Orizaba

Walter Pascua Thomas Penzi, III Shelly Pesak Kelly Powell Sean Price Faustino Quiroz Tim Reardon, IV **Rey Regresado** Carl Richardson Jenice Ricks Juan Rodriguez **Brad Rogers** Johnny Runyan Jake Ruttle Tong Sahnon Isauro Salinas Jared Schneider Donald Seay **Ernestine Shepard** Jeffrey Snover Phyllis Sousley Don Stowe Katie Swinson Steve Swinson Ramon Tapia Mike Thamm Karen Thomas Bruce Turner Justin Underwood Salomon Vega Scotty Walker Shane Williams

KEY BUSINESS PARTNERS

>> Burns & McDonnell CenterPoint Energy ChemTreat **DaCott Energy Services EDF Energy Services** Frost Bank GE Power & Water - Distributed Power HALO Branded Solutions Inc. Jackson & Ryan Architects Johnson Controls, Inc. Lockton Companies, LLC Soteica Visual MESA LLC Stanley Consultants Tellepsen Toshiba International Corporation Westerlund Communications Inc.

Photos Bruce Bennett unless otherwise noted.

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"We can't always stop disasters from happening, but we can get prepared."

Texas Health and Human Services/Department of State Health Services, www.texasprepares.org/



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