# Lessons learned from Hurricane Harvey

By Laura Cassiday

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- The Gulf Coast region of the United States is home to many of the country's oil refining and petrochemical plants.
- In late August 2017, Hurricane Harvey caused massive flooding in and around Houston, Texas.
- Many companies in the area activated well-rehearsed emergency plans, but each natural disaster affords new opportunities to refine and improve the plans.

In the early morning hours of August 31, 2017, two explosions rocked the flooded Arkema chemical plant in Crosby, Texas, sending flames and a plume of black smoke high into the air. The facility produced liquid organic peroxides, which must be refrigerated to prevent their decomposition and subsequent ignition. When the area received more than 40 inches (1 m) of

rain from Hurricane Harvey, floodwaters cut off power to the original refrigeration system and swamped backup generators. Arkema employees moved the flammable organic peroxides to nine semi-trailers, which they transported to higher ground and cooled with diesel-powered refrigerators. However, in the wake of unprecedented rainfall and up to 6 feet (1.8 m) of floodwater, these precautions were not enough, and the refrigeration systems failed, triggering fiery explosions in two of the trailers. A few days later, Arkema employees ignited the remaining trailers in controlled burns so that workers could safely begin assessing damage to the rest of the plant



Arkema executives claim that they made extensive emergency plans in preparation for Hurricane Harvey, but nobody could have anticipated rainfall or flooding of that magnitude. Nevertheless, Hurricane Harvey has prompted many companies, in and out of the Gulf Coast, to rethink their emergency preparedness plans. No region is completely immune to disasters, whether hurricanes, tornadoes, earthquakes, wildfires, or terrorist attacks. Emergency plans are never considered "finished products," but should be periodically reviewed and modified with lessons learned from previous disasters.

# Industry hotbed

The Gulf Coast, which encompasses US states that border the Gulf of Mexico, is the heart of the US oil refining and petrochemical industries, mainly because of its proximity to feedstock materials such as natural gas. Also, the Gulf Coast offers deep-water ports, pipeline and storage networks, and a skilled refining workforce. More than 25% of US oil refinery capacity and 50% of the nation's downstream chemical production are located in this region (Bomgardner, M. M., https://tinyurl.com/CEN-Harvey, 2017). In particular, Texas is the largest chemical-producing state in the United States, with $129 billion in shipments annually (American Chemistry Council, 2017). Louisiana, another Gulf Coast state, is the fourth-largest producer of chemicals, with $51 billion in annual shipments.

Texas produces nearly 75% of the US supply and 15% of the world supply of ethylene, a basic chemical building

block used to make everything from plastic containers to automobile parts to disposable diapers (Kaskey, J., https://tinyurl.com/ethylene-Harvey, 2017). Ethylene is produced by heating natural gas in massive furnaces, or steam "crackers," that break long-chain hydrocarbons into shorter molecules. Processing plants then convert the gaseous ethylene into polyethylene, the world's most common plastic, and many other products such as ethylene oxide (used to produce surfactants and detergents), ethylene glycol (antifreeze), polyvinyl chloride (PVC; used in pipe, windows, and bottles), and polystyrene (used for packaging and insulation). Ethylene and its derivatives comprise about 40% of global chemical sales.

The Gulf Coast is no stranger to tropical storms. Recent major storms include Tropical Storm Allison in 2001, Hurricanes Rita and Katrina in 2005, and Hurricane Ike in 2008. Therefore, as Hurricane Harvey approached the coastline in late August of 2017, many companies activated well-rehearsed emergency plans.

## Battening down the hatches

According to the American Chemistry Council (ACC), emergency plans vary with storm severity but may include complete shutdown of the facility, evacuation of personnel, activation of generators, filling of tanks, physically securing equipment, and removal of unnecessary equipment and vehicles (https://tinyurl.com/Harvey-ACC, 2017). In accordance with the ACC's Responsible Care® program, all ACC members must have established emergency plans that are activated in coordination with local, state, and national authorities, as well as with other businesses and transportation systems in the path of the storm.

On August 24, as Hurricane Harvey gained force and approached the Texas coast (Box 1), dozens of refineries and chemical plants initiated shutdown procedures. When a chemical facility shuts down, excess gases that cannot be processed are often flared, or burned. An industry "best practice," flaring safely relieves pressure during shutdown and is conducted with the permission of state and federal regulatory authorities (ACC, https://tinyurl.com/Harvey-Dooley, 2017). Chevron

Phillips Chemicals, a producer of ethylene, polyethylene, and other chemicals, reported that they sent 766,000 pounds (347,000 kg) of chemicals including ethylene, 1,3-butadiene, and benzene to flare as the plant shut down (Lefebvre, B., https://tinyurl.com/politico-Harvey, 2017).

## Hurricane Harvey timeline

August 24: Hurricane Harvey, a category two hurricane, headed towards the Texas coast. Numerous refineries and chemical plants in Texas shut down ahead of the storm. Ocean ports began to shut down.

August 25: Harvey, which was upgraded to a category four hurricane, made landfall at 10 p.m. near Rockport, Texas.

August 26: Harvey, which was downgraded to a tropical storm, moved into the Houston area.

August 27: Harvey remained in the Houston area, bringing over 50 inches (1.3 m) of rain in some areas and severe flooding.

August 29: Some refineries and chemical plants reported releases of chemicals or emissions as a result of flooding or shutdown procedures.

August 30: After 5 days of rainfall, Harvey moved from the Houston area into eastern Texas. River, port, truck and railroad traffic and many crude oil pipelines remained closed.

August 31: Two semi-truck containers of liquid organic peroxides ignited at the flooded Arkema plant in Crosby, Texas.

September 1: More than 20% of US refining capacity was offline due to storm-related shutdowns. More than 50% of total US ethylene production remained offline.

> September 5: Houston-area universities resumed classes.
>
> September 6: A week after Harvey made landfall, many chemical plants remained shut down as they completed pre-startup safety checks. All but three ports were reopened. Railways began to restore service.
>
> September 15: Most refineries and chemical plants had restarted. Transportation backlogs remained.

Unplanned shutdowns can cause facilities to emit large amounts of volatile chemicals that surpass permitted air pollution levels. From August 23 to August 30, 46 facilities in 13 Texas counties reported an estimated 4.6 million pounds (2.1 million kg) of airborne emissions that included benzene, toluene, carbon monoxide, nitrogen oxide, and sulfur dioxide, which greatly exceeded state limits (Griggs, T., *et al.*, https://tinyurl.com/Harvey-NYT, 2017). Although environmental groups and many citizens were concerned, federal and state regulators claimed that air monitors did not detect levels of emissions that are harmful to human health.

In laboratories, researchers prepared for flooding and power outages (Williams, S., and Grant, B., https://tinyurl.com/Harvey-The-Scientist, 2017). They hooked up freezers and refrigerators storing sensitive samples to backup generators. They moved instruments from floors to tabletops and relocated laboratory animals to higher shelves. Researchers also stored water for the animals in the event that clean running water became unavailable. Any data not already backed up were transferred to remote servers. In many facilities, nonessential personnel were sent home as the storm approached. A small hurricane "ride-out team" remained on-site to maintain the facility, monitor conditions, and make repairs.

## The storm and its aftermath

With estimated damages and losses totaling more than $190 billion, Hurricane Harvey is the costliest hurricane

on record, due mainly to catastrophic flooding in the Houston area. Hundreds of thousands of people were displaced from their homes, automobiles were flooded, and 300,000 people in Texas lost electricity. Harvey caused 91 confirmed deaths.

Unlike many homes and businesses in the Houston area, most oil and petrochemical plants were spared from extensive structural damage and flooding due to facility design, including the strategic placement of dikes and levees. However, even after the storm had passed and the leaks had been mopped up, many facilities were not able to restart for days or weeks. Because transportation by truck, railway, and barge was severely disrupted until at least September 5, refineries and chemical plants were unable to receive shipments of raw materials. Even if companies did not shut down, they were unable to transport shipments of finished products out of their factories. Due to widespread flooding of streets and highways, many employees could not reach their workplace, and others were dealing with flooded or otherwise damaged homes. These lingering transportation issues delayed the restart of many refineries and chemical plants.

Ultimately, Harvey disrupted more than one-third of US chemical production (Kaskey, J., https://tinyurl.com/Harvey-production, 2017). Harvey's immediate impact on the US production of several petrochemicals, assessed by ICIS, is shown in Table 1. On August 31, Bloomberg and other sources reported even higher numbers: 61% of the US production of ethylene, 50% of polyethylene, and 60% of polypropylene was shut down (Kaskey, J., https://tinyurl.com/ethylene-Harvey, 2017). Many plants did not reopen until weeks or months after the storm. Shortages of petrochemicals persisted through the end of the year, driving up prices. The hurricane caused the greatest ever disruption to US refining capacity, with more than 20% of US refineries offline and 10% operating at reduced rates on Friday, September 1.

TABLE 1. Harvey impacts on US petrochemical capacity, August 29, 2017. Credit: ICIS Supply & Demand database, ICIS analysis

| Petrochemical | Reduction in capacity due to shutdowns |
|---|---|

| | |
|---|---|
| Ethylene | 36.6% |
| Benzene | 31.1% |
| Polyethylene | 25.5% |
| Polypropylene | 24.8% |
| Propylene | 23.3% |

In addition to emissions of gaseous chemicals during plant shutdowns, several facilities reported the release of gaseous or liquid chemicals from storage tanks as a result of heavy rainfall. At Exxon Mobil's Baytown, Texas, refinery, the external floating roof on a storage tank partially sank during heavy rains, causing the release of benzene, toluene, and volatile organic compounds into the air. Similarly, at a Valero Energy Partners refinery in Houston, the floating roof of a crude oil storage tank partially flipped, releasing benzene and other volatile organic compounds. In Pasadena, Texas, a gasoline tank at Kinder Morgan, a pipeline transportation and energy storage company, tilted due to the large volume of rain, releasing gasoline into a containment dike.

At Royal Dutch Shell's refinery and petrochemical complex in Deer Park, Texas (Fig. 1), two floating roofs on storage tanks containing gasoline components sank into the tanks after heavy rainfall exceeded the roof's capacity to drain water. "Such a circumstance is extremely rare, as those tanks were built to industry standards designed to protect the tanks' integrity," says Ray Fisher, Shell company spokesperson. According to Fisher, a third tank containing a gasoline component leaked about 400 gallons into a nearby containment area. Shell responders vacuumed the spill from the area.

"In each of these tank incidents, all liquid products leaked were contained within engineered barriers," says Fisher. "This, coupled with the timely and deliberate response of our well-trained employees, minimized the consequences of these events." Shell responders quickly applied foam to the leaked liquids to suppress vapors. According to Fisher, industrial health monitoring in the surrounding community during Hurricane Harvey did not detect any emissions impact from Shell's operations.

FIG. 1. Aerial view of the Shell Deer Park Manufacturing Site in Deer Park, Texas (about 20 miles east of downtown Houston). Credit: Shell International Ltd.

# Starting up

By September 14, 2017, most petrochemical plants along the Texas coast had restarted or initiated restart procedures (Hays, K., https://tinyurl.com/Platts-CP-Chem, 2017). Before a plant can be restarted, a specially trained team must visit the site to evaluate damage and ascertain that conditions are safe for other employees to return. Restarting operations in a large facility can take several days, as operators conduct inspections and restart equipment in phases. Safety precautions must be followed meticulously. Shutdown and restart are the two times when refineries are most likely to explode (Wray, D., https://tinyurl.com/HP-refineries, 2017). As in shutdowns, excess emissions are often released during startups.

Restarting a petrochemical plant requires the establishment of stable flows, levels, temperatures, and pressures within large equipment (U.S. Chemical Safety and Hazard Inspection Board (CSB), https://tinyurl.com/CSB-alert, 2017). Sometimes, damage to equipment cannot be detected until restarting is attempted. Floodwater may have leaked into tanks, or debris could have damaged electric motors or blocked drains. According to a Safety Alert issued by the CSB, petrochemical plant operators should check process equipment thoroughly for damage, including storage tanks, pressure vessels,

insulation systems, sewers and drains, furnace systems, electric motors, and emergency warning systems.

# How four AOCS members weathered the storm

In December 2017, *Inform* talked with four AOCS members, individual or corporate, who were affected by Hurricane Harvey (Fig. 2). Their stories illustrate how good preparation can greatly mitigate the impacts of natural disasters. Nevertheless, every storm offers the opportunity to refine emergency plans, incorporating lessons learned about which aspects of the plan worked well and which need improvement.

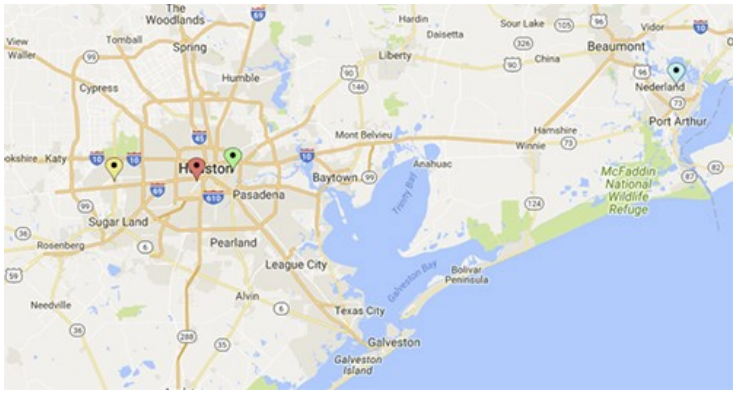


FIG. 2. Locations of four AOCS members affected by Hurricane Harvey. The hurricane made landfall in Rockport, TX, and moved east through the Houston area. Credit: Google Maps

Mark Guadagnini, General Manager, Shell Technology Center, Houston, Texas

The Shell Technology Center is a 44-building, 200-acre energy research complex that employs about 2,000 scientists, technologists, engineers, consultants, and sales and support personnel. The facility did not experience any structural damage or flooding from Hurricane Harvey, but the heavy rain, sometimes blowing sideways, caused leaks in roofs and walls.

As Hurricane Harvey approached, Guadagnini and colleagues implemented site contingency plans and

worked closely with the laboratory community to determine which research processes must remain operational during the storm. Some of the laboratories and pilot plants were conducting experiments that had run continuously for 2 years or more, so they were given priority. "We discussed which research processes needed to remain active, and how they could remain operational during the storm," he says. "If they didn't need to remain active, then we had to give enough notice so they could be shut down in a controlled fashion prior to shutting down the facility." The Shell Technology Center has its own utilities plant, so the team calculated the scaled-down electricity they needed to generate to run ongoing experiments and provide air conditioning and power for the skeleton crew that remained on-site.

Before Hurricane Harvey made landfall, Shell Technology Center employees covered valuable equipment with sheets of plastic and placed sandbags around doors in buildings that housed critical assets. They pumped water out of a decorative pond to help prevent flooding. "One of the things we learned is that you can't have enough sheets of plastic available to cover stuff," says Guadagnini. "Everybody is going to underestimate the amount of plastic and tape needed for an event like this. It's almost like you can't have too much."

A 20-person hurricane "live-in team" remained at the facility for 5 days, while other employees were sent home. Team members had diverse backgrounds in engineering and repair. "If you remember the television show MacGyver, I was surrounded by a bunch of MacGyvers who knew how to fix things and make something out of nothing," says Guadagnini. "Those guys were able to make some repairs on the spot and get things started, and that enabled us to be back up and operational only four days after the hurricane."

After the storm, the Shell Technology Center brought the experiments and chemical processes back to full operations in a disciplined, controlled manner. "Although we could quickly bring equipment and utilities back online, we didn't have the people in place to start everything back up until the roads cleared and dried out," says Guadagnini. Due to transportation issues, the facility also had problems obtaining

chemicals, equipment, and spare parts for at least 10 days after the storm. “So that also went into the calculus of what to bring back to operational status and what to leave shut down—our ability to get logistically resupplied,” he says.

Guadagnini credits communication, preparation, and practice for the success of the Shell Technology Center in weathering Hurricane Harvey. “We worked very hard at the start of the year on revitalizing our hurricane preparedness plan, and we took many opportunities to communicate with our employees about the plan,” says Guadagnini. Employees practiced the emergency preparedness plan through a series of table-top drills, where a particular disaster scenario was presented, and employees had to respond to it using the plan. The center as a whole was then debriefed on lessons learned from the exercise. “My best advice is to take the opportunity to train to your plan,” says Guadagnini. “If you don’t practice something, you’re going to be terrible at it. Conversely, if you practice your plan, then you will do well in execution.”

### Robert Poullard, Laboratory Manager, Jacob Stern & Sons, Houston, Texas

Jacob Stern & Sons is a company that imports, exports, processes, and distributes animal fats and oils. At their facility in Houston, the company has more than 40 storage tanks containing different grades of tallow that are used in soaps, personal care products, and cosmetics. Jacob Stern & Sons is located along the Houston Ship Channel, giving the exporter access to ocean-going vessels. During Hurricane Harvey, the facility experienced some flooding and roof leaks but suffered no substantial damage. “The office buildings had the most damage,” says Poullard. “We still have big holes in the ceilings, and the roof still needs to be repaired, but the plant is working at almost 100% capacity.”

Jacob Stern & Sons only had to shut down completely for about half of a week. However, the company, like others in the area, experienced transportation issues for much longer. “Most of our products are delivered to us by trucks and by rail cars, but they couldn’t get to us for a week to two weeks,” says Poullard. “Our business consists of exporting, and we just couldn’t get any ships here when the time called.” He also says that the

company experienced some brief power outages.

Some docks along the Houston Ship Channel were flooded by the waterway. However, Jacob Stern & Sons was not affected substantially because high levees were built around storage tanks to protect them from flooding. In the days before the storm, employees boarded up windows. "This isn't our first rodeo, so we knew what was coming and prepared ahead of time," says Poullard. "But Harvey wasn't so much a wind event; it was mostly rain."

After streets and highways flooded, some employees were stranded at the Jacob Stern & Sons plant for more than 48 hours. Poullard couldn't get back to the plant because the streets surrounding his neighborhood were flooded. "Interstate 10 is one of the main freeways that runs through the city, and we couldn't get to it because it was flooded," says Poullard. "The freeway exits around here had over 10 feet of water, so even if you could get on the freeway, you couldn't get off it." Some employees voluntarily stayed at the facility to keep an eye on things. "A lot of guys who have been here for 30 or 40 years wanted to stay to help out in case something went wrong," says Poullard. "We've got a lot of good guys here who have been through this before and don't mind just hanging around and making sure the plant is okay."

Because Jacob Stern & Sons is located along the Houston Ship Channel, a possible target for terrorists, the company plans ahead for both natural and manmade disasters. "We prepare for any kind of disaster, because you just never know," says Poullard. "We practice that, we preach that, and we coordinate with the Coast Guard."

William Wilson, Lab Manager, Department of Chemistry, Rice University, Houston, Texas
Rice University is a private research university located in central Houston. The 295-acre wooded campus is adjacent to the Texas Medical Center. Due largely to improvements made since Tropical Storm Allison in 2001, Rice University suffered minimal damage from Hurricane Harvey. Several buildings had minor damage due to leaks, and at least three basements flooded. Many of Rice's almost 4,000 undergraduate students remained on campus in their dormitories during the

storm. The university was closed for 10 days because of the hurricane, reopening on September 5.

Because the roads on and around Rice University were flooded, students and employees who lived off campus were advised not to attempt to reach the university. However, Wilson, who manages the lab of Professor Seiichi Matsuda, managed to make it to work every day. "Most people could not drive to work because freeways and major roads were impassable at certain places," says Wilson. "Yet I could get almost anywhere on my bicycle within a 7-mile radius of Rice University, day or night—except on Sunday, when I had to cross on the railroad trestle."

On Sunday, August 27, the worst day of flooding, Wilson started bicycling toward Rice. Although bayou bridges were flooded with raging water, he walked safely across on a railroad trestle, with a "dazzling yet terrifying view of lakes everywhere." The final 3 miles involved wading through ankle-deep to waist-deep water. "Running through floodwater is dangerous because it is easy to stumble over a curb," says Wilson. Wading through floodwaters is also not advised due to risks from fire ants, bacteria, displaced manhole covers, and drowning. Dangerous snakes often seek the higher ground of railroad tracks during floods.

Nevertheless, Wilson made it to the lab building, which he says was "virtually deserted." The building did not experience any power outages because of the storm, so Wilson attempted to spend $4,000 in remaining research grant money that expired on August 31. "I tried to persuade vendors to bill our credit card and send an invoice, but delay shipment for a week," says Wilson. "Instead, the opposite happened. One company immediately sent us biological supplies requiring -20 °C refrigeration, and they arrived after 10 days at room temperature." Because of storm-related difficulties, Wilson was only able to spend about half of the expiring grant money.

In preparation for Harvey, Wilson shut down the lab's mass spectrometers and other expensive equipment, and readied 20-amp extension cords to plug the -80 °C freezers into emergency power sources, if needed. Because the lab was located on the third floor of the building, flooding was not a concern. "Unlike

preparation for rain coming in broken windows from the fierce winds of Hurricane Ike in 2008, I was not worried about broken windows from Harvey," says Wilson. According to Wilson, the nearby Texas Medical Center (TMC) took serious precautions to protect against flooding after being devastated by Tropical Storm Allison in 2001. "TMC's actions inadvertently helped protect Rice and the University of Houston from flooding," he says. TMC's measures included new flood-resistant buildings, floodgates, and elevated power supplies. In addition, Brays Bayou, which runs directly through the TMC and is adjacent to the University of Houston, was widened from the TMC to several miles downstream after it caused massive flooding during Allison.

Chad Anderson, Site Director, Port Neches Operations, Huntsman Port Neches, Texas
Huntsman's Port Neches Operations facility makes propylene and ethylene, converts them to propylene oxide and ethylene oxide, and then derivatizes the oxides to generate surfactants, amines, and glycols. With three ethylene oxide units, the Huntsman Port Neches plant is the largest single-site producer of ethylene oxide in North America.

During Hurricane Harvey, Huntsman shut down six manufacturing sites, including Port Neches, as well as the world headquarters building and the Advanced Technology Center located in The Woodlands, Texas. According to Anderson, Port Neches Operations experienced flooding, but no major structural damage. The Port Neches facility had several flooded buildings, mostly in maintenance areas. Floodwaters entered some electric motors, requiring the motors to be removed from equipment and dried. "For the most part, the damage was quite minimal to our facilities," he says. "The main effect that we had was the effect on the surrounding community, which prevented employees from coming to work and prevented deliveries and shipments to and from the facility. And, of course, we were restricted with power and things of that nature from time to time as a result of the hurricane."

Anderson and coworkers brought the Port Neches facility to an idle four days before the hurricane struck the Houston area. "We were having issues getting trucks into and out of the facility several days in

advance of the storm, so we shut the facility down," says Anderson. "We did leave our utilities section of the plant running so as not to allow the steam lines and things of that nature to go cold during the event."

For about 2.5 weeks, a ride-out crew remained at Port Neches, maintaining the facility and operating the cogeneration units that produced electricity. Port Neches' first ethylene oxide unit went back online on September 4, and the site had returned to pre-Harvey operating conditions by September 16. Harvey's impact on Huntsman's third quarter net earnings for all sites was estimated to be $50 million.

Port Neches Operations was affected previously by Hurricanes Rita and Ike. "With Hurricane Rita in 2005, we learned a great deal about setting up timeframes to start idling production and making decisions about whether to keep the plant running or shut it down," says Anderson. "We further refined that procedure during Hurricane Ike." Now, Huntsman has an emergency procedure that varies slightly with the location, intensity, and hazards of the storm. With regard to hazards, Hurricane Rita was mainly a wind event at Port Neches, whereas Ike was a storm surge event. "Harvey had some wind but no storm surge. It was mostly a rain event, so it tested our procedure again," says Anderson. "But whenever you start losing your ability to move raw materials into and products out of the facility, it pushes you down your timeline of bringing the plant to an idle state and sending your nonessential people home."

Following Hurricanes Rita and Ike, Huntsman also changed some of their building practices within the Port Neches facility. "All of our new construction is about 8 feet off the ground to protect from a potential storm surge or flooding event," says Anderson. "We've also started raising critical instrumentation and electrical infrastructure up to a certain level." He notes that Jefferson County, where Port Neches is located, has a 13-foot (4-m) retaining wall that protects the area from significant storm surges. Anderson has some advice for other companies preparing for natural disasters. "Don't ever say, 'This will never happen here,'" says Anderson. "We never expected to see 5 feet of rain in a 5-day period, but it happened. As you go through your procedure reviews and preparations for inclement weather, the impossible can be quite possible, so

prepare for the impossible."

He also has some advice about making the decision to shut down a facility or keep it operating. "Don't think about what you can make during the storm; think about how quickly you can recover at the end of it," says Anderson. "We run highly hazardous processes, so we're going to shut the processes down, allow the event to pass, and then we should be in much better shape to start things up and get more quickly back to normal operations." Anderson says that the Huntsman leadership fully supported the decision to shut down operations. "The only pressure we got from the company was to do it safely, and do it compliantly," says Anderson. "It's very nice to have that support from the CEO down to protect your people, protect the environment, and protect your assets."

During the storm, Anderson was inspired to see Huntsman employees helping each other and the community. "We had an employee who was actually trapped in his attic by floodwaters. His house had 8 feet of water in it," says Anderson. "We had three employees go home, get their boats, and rescue him and his family out of his house. Then they moved on to other houses in the neighborhood." After the storm ended, teams of Huntsman employees helped clean up other employees' homes that were damaged by the hurricane. Jon Huntsman, Sr., founder of the company and Chairman Emeritus, donated $2 million to establish the Huntsman Flood Fund to help the community recover.

Anderson estimates that about 250 of the 620 Huntsman employees at the Port Neches site sustained damage to their homes from the storm. "We've got people who come to work and do their normal job from 8 a.m. to 5 p.m., or whatever their shift might be, and then they're going home and trying to rebuild," he says. "The area's back to normal by no stretch of the imagination, but the plant's back to normal and running smoothly. People are just trying to rebuild their lives outside of the facility."

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