

# HURRICANE HARVEY LESSONS LEARNED

The lessons learned came from discussion of Harvey by community and plant participants in the following six advisory panels to industry during their first meetings after Harvey: Bay Area Community Advisory Panel (BAYCAP), Citizen's Advisory Council to La Porte Industry (LPCAC), Community Advisory Panel to Lyondell and Equistar (Channelview plant) (CAPLE), Deer Park Community Advisory Council (DPCAC), Galena Park-Jacinto City Community-Industry Partnership (GP-JC CIP), and Pasadena Citizens' Advisory Council. There are ~110 plants in these 6 community advisory panels (CAPs), which are facilitated by Diane Sheridan, who compiled this summary and a more detailed report. A list of participating plants and the communities the CAP serves may be found in the *CAP Directory* at [www.deerparkcac.org](http://www.deerparkcac.org)

## Background

- Hurricane Harvey made landfall in Port Aransas as a Category 4 storm, then meandered exceptionally slowly up the Texas coast. It was not really a hurricane when it reached the Houston area and dumped ~40-50 inches of rain over 5+ days. In Harris County, it was a tropical storm whose rainfall intensity and duration caused flooding rather than the high wind and surge damage of major hurricanes. Whereas most bad floods have affected part of Harris County, Harvey affected all of this county and many more. ***Most plant hurricane plans are phased plans based on wind speeds and days from landfall, not flooding.***
- Before the storm hit, Harris County Judge Ed Emmett pre-applied for Harris County to be designated a federal disaster area. This allowed the state to move its resources, including equipment and state military personnel, closer to the county before the storm.
- David Wade, the Harris County Industrial Liaison, operates the East Harris County Manufacturers Association (EHCMA) Hurricane Status Reporting System for EHCMA's Emergency Management and Communications Committee. Plants provide information that is solely for emergency response coordinators (EMCs) in Harris County and east Harris County cities so the EMC has contact information for the site and knows whether plants in its jurisdiction have a ride-out crew on site. Not all plants took part in the system.
- During the storm, the area south of I-10 and east of I-45 was without a functioning hospital for 72 hours. Most EHCMA member plants are in this area.

## Summary of Lessons Learned

- **Expand plant hurricane plans to account for flooding** from intense and long-lasting rainfall during or independent from hurricanes. **Coordinate with other plants on same site.**
- Account for needs specifically related to flooding:
  - Have an accurate understanding of your **site elevation**.
  - When installing backup power systems, **elevate backup generators** sufficiently.
  - Improve lightning arrestors.
  - Determine how best to **keep pumps dry**. Determine which can be moved out of the area prior to the storm and, conversely, whether additional, bigger, pumps will be needed to pump floodwaters out of the plant.

- Acquire effective **sandbags** and enough **rubber boots**.
- Recognize that your ability to operate the plant will be affected by **whether workers are able to travel** to the plant and travel home. Staff with employees with multiple skills. Consider whether to enlarge size of ride-out crew or how to replace them in an extended event. Acquire enough (good) food before roads are impassable. Have extra cots on hand and laundry capability. Secure nearby hotel rooms early to stage relief crews and provide high-water vehicles so they can reach the plant.
- Determine how to deal with medical needs **if hospitals are not available**. Anticipate injuries associated with a storm and how to prevent them.
- Consider how to deal with **supply chain disruptions** when suppliers, customers, and distribution systems are not operating normally.
- Set up an **employee accountability system** that will work for your situation; some found off-site systems the most successful. Create lists with more than one way to contact an employee and keep them up to date. Determine the frequency with which to contact employees in a long-term event like Harvey because situations change.
- Consider the kinds of **phones/service** needed in the event of disruptions: land lines, cell phones, satellite phone.
- Anticipate the need to **assist employees** affected by the storm and what the plant and corporation can do to help them personally and to enable them to return to work and concentrate while on the job. Help during Harvey included financial help of many types; personal time off; employees volunteering to help others; equipment and supplies for cleanup, remediation, and repairs; housing, cars, and gasoline; access to company resources for restoration, legal advice and more; and food.
- Consider how you will **help your community**; e.g. donations; cleanup for which you have special skills and equipment; equipment to assist cities; rescues; and more. Donations during Harvey that were specifically related to the storm included lending a big pump to a city water purification plant that prevented floods from shutting it down; fuel for first responders; PPE for residents cleaning up after the storm; and funds for vaccines such as tetanus for a city health department.
- **Sign up for the EHCMA Hurricane Status Reporting System** not just so the county and city emergency response coordinators know your status but also, so you receive information from the Harris County Industrial Liaison. For example, David Wade told plants several days before Harvey arrived that it would be a historic storm, based on the predictions of the Harris County meteorologist. Wade also warned plants early in the storm that the crew at work on Saturday likely would become a *de facto* ride out crew.

A more detailed summary of the discussion by these 6 CAPs may be obtained from facilitator Diane Sheridan at [dbsfacilitator@gmail.com](mailto:dbsfacilitator@gmail.com)