

## **Focus group interview with oil and gas companies management**

### **Consolidated report**

#### **1. Plant shutdown**

##### ***Preparedness to the hurricanes and storms:***

- The safe stop of plant activity takes 24 to 48 hours.
- Usually, it takes a few weeks to close the facility. shutdown takes from 1 to 2 weeks. Even in case of complete shutdown, it is preferable to keep some activities hot, cool or running (for example hot asphalt moving through pipelines (when it gets cold it can dry and destroy pipeline), some chemical reservoirs required to stay cold (temperature increase can cause an explosion))
- There are specific activities to proceed for the complete shutdown of the plant. These activities are specified in plants' hurricane policies and this document updates based on experiences of each event. (28<sup>th</sup> edition of hurricane policy is the most recent manual for this plant)
- In order to start shut down procedure on time, they use meteorological services to receive weather updates.
- The plant has special communication devices always active in case of these events (such as satellite phones and shortwave radios).

##### ***Risk related to Harvey:***

- Most of the plants were prepared to receive Harvey.
- The facility is designed to handle natural disasters of these kinds.
- Too much rain fallen during Harvey and the internal drainage capacity of plants is only 14 - 17-inch floodwater in 24 hours.
- Harvey caused a shutdown of the facilities.
- More detailed local weather, flood and river-water forecast, and prediction models needed.
- Conflicting information about rainfall from meteorological services created communication issues.
- Loss of the city's water service caused a significant problem to continue running air conditioners.
- Nitrogen and oxygen supplies were disrupted.

##### ***Best practices of risk management and lessons from Harvey:***

- Preparation for hurricane season starts in May. In response to Harvey new policies and procedures have been put in place. In some plants, new chapters related to flooding have been added in hurricane preparedness guide.
- To manage water flush in a more efficient manner plants improved their drainage system.
- Production facilities and equipment raised to minimize potential flooding damage.
- As a response to Harvey, new weather stations created and more stations planned to be established in the future for more accurate predictions of rainfall/wind events.
- Establishing a more detailed local weather network could assist the industry to prepare and respond to emergencies. There is a need for real-time rainfall measuring stations and weather stations and more accurate flood forecasting models.
- For better measurement of floodwater and rain, water sticks placed in the key locations of the plants in order to measure flood levels more accurately and manage the crisis more efficiently.
- A simple solution to overcome the threat of loss of the city's water was to use fire water to run air conditioners.
- Most of the plants didn't lose power. Utilities (power and steam) were kept running at all times during Harvey and Imelda.
- Pumps become demanded during hurricanes and storms. The pump rental will help to manage to floods better.
- Shared satellite service for all refineries in the hurricane period can be a better solution than having those phones active all year. (researchers' suggestion).

## **2. Plant restart**

### ***Post-hurricane recovery:***

- Restarting refinery's activity takes 1 to 4 weeks, however complete economic recovery takes much longer.
- Logistics problems to transport spare parts, raw materials and products.
- The river is a critical and strategic logistical resource. When the river shuts down it creates significant problems for shipments of raw materials and finished products.
- There is also a high reliance on pipelines which are more resilient to hurricanes and storms. But maintaining pipelines active is an important task during hurricanes (especially those pipelines that transport hot materials such as asphalt).
- Railroads are the next important transportation mode for raw materials and finished products.
- To restart refinery after the hurricane there is always a need for spare parts.

### ***Risks related to Harvey:***

- The magnitude of Harvey was too big which caused a deficit of spare parts. Plant inventory and local suppliers couldn't meet post-Harvey demand. (hundreds of motors had to be replaced or repaired after Harvey. Year after there is still corrosive damage of equipment throughout the plant)
- Most of the spare parts have been delivered to Houston, but transportation channels from Houston to Beaumont were not active.
- It took about 7 days to get back to normal operations after Imelda vs 4 weeks in the case of Harvey.

***Best practices of risk management and lessons from Harvey:***

- Now suppliers and plants have more inventory, even though keeping more inventory generates additional costs and inventory also is under risk to be damaged during hurricanes.
- Implement post-hurricane plant restart training for employees as preparedness.
- Spare parts shipment hub in the Beaumont airport area can be the best solution to fix the issues related to post-hurricane recovery for the entire industry.
- In some cases, large supplies and machinery were transported by helicopter from other plants to the Montagne Center.
- Zoned maintenance helped to address issues quickly.
- Flexible production practices can help to identify which production can be restarted in which time with the different levels of operations (in case of Harvey jet fuel production started earlier than the production of other products as they had enough inventory in tanks).
- Budgeted funds to purchase necessary supplies during the recovery period.

**3. Human resource management during plant shutdown and restarting procedure**

***Hurricane's impact on human resource management:***

- Refinery shut down and especially recovery needs extra manpower.
- Hiring new employees is a time-consuming procedure in the oil and gas industry due to safety training and background check.
- A road closure is another challenge as it's the main way to get employees to work.

***Risks related to Harvey:***

- Nearly half of the employees of the oil and gas industry impacted personally.
- Due to personal damage and lack of their ability to report for work many employees couldn't show up when refinery opened.

- Personnel on-site was not able to leave to go home, while personnel off-site was not able to get to the refinery and chemical plant.
- Strict guidelines and safety protocols add additional time in hiring new temporary personnel and this slows down the recovery.
- High demand for workers to recover from previous hurricanes in the same year affected the job market.
- It became difficult to identify vendors to supply food to employees on site.
- Medications for employees on-site became an issue.

***Best practices of risk management and lessons from Harvey:***

- Remote work for those employees who could complete their tasks from distance helped to manage human resources more efficiently
- During recovery, there is no need for one part of employees to be on the worksite. Some companies used their workforce efficiently offering them opportunities to help to fix houses of other employees and communities.
- Employees hosted in temporary housing near refinery to avoid transportation problems. However, there is a need for more reliable housing solutions other than just staying in hotels that have available rooms and plants of office buildings.
- One of the oil and gas companies has a centralized response team that takes over the emergency response on-site (the emergency response team allows to go back to normal operations quickly).
- Since Hurricane Rita, plants have implemented better and accurate communication with employees. Many channels have been used to ensure instant communication including text alerts and social media postings by oil and gas companies, communication by city. A future step can be creating real-time logistics maps to facilitate employees' and suppliers' access to production sites.
- Reduce bureaucracy and red tape regarding the use of drone technology.
- Practice to set up medical and financial teams to handle employees' immediate needs during a crisis.
- Additional hotels/temporary housing solutions for workers are needed during these events.
- Pre-certification and pre-security screening can shorten the time for new temporary workers to rapidly start working on refinery's recovery.
- Some oil and gas companies are contemplating acquiring a "High Water Vehicle" with 40" tall tires to get essential personnel to the site from their residences if necessary.

**Oil and gas industry's overall resiliency and recovery from natural disasters**

After by nature two different natural disasters (Harvey and Imelda), there was no permanent loss of production capacity of refineries and petrochemical plants. It is an important sign of the resiliency of the oil and gas industry in such events. However, the shutdown caused a big financial loss due to replacement and recovery expenses and a temporary decline in production capacity. Months after, oil and gas companies still spending money to fix the damage from Harvey and Imelda. More robust collaboration and communication are necessary between government and industry. Risk management knowledge, skills, and resources are necessary for resiliency and recovery from natural disasters.