

## Avoiding criminal liability after a flood: Lessons from Hurricane Harvey

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Imagine that you are your company's general counsel or senior environmental, health, and safety (EHS) lawyer and have just suffered through the disruption and displacement caused by a hurricane and subsequent flooding. Your facilities have been offline, some employees have lost their homes, and business units are attempting to recover. The news media report that the local district attorney has opened a criminal investigation of one of your facilities because she is not satisfied with how the facility prepared for the storm. What could you have done differently—prior to the storm—to have helped the facility be better prepared?

### **Not an imaginary scenario**

The Harris County (Texas) District Attorney's Office opened a criminal investigation of a chemical plant after Hurricane Harvey to explore whether the company committed any crimes that resulted in pollution of the environment. The district attorney was reacting to an explosion and fire at an organic peroxides plant after the hurricane that dumped 51 inches of rain in the facility's vicinity.

Organic peroxides are reactive chemicals used in the manufacture of many consumer products and must be stored at temperatures below 20 degrees Fahrenheit to prevent decomposition and fire. The plant has a refrigeration system to keep the storage warehouses cool. The plant was concerned that the persistent rain might cause the plant's electrical power sources to fail, so personnel transferred the organic peroxides from storage warehouses to refrigerated trucks. The plant's electrical power source and backup generators did fail and, eventually, the power sources on individual trucks also failed, causing a steady rise in temperature within the trucks. The company anticipated decomposition and explosion, and emergency responders issued an evacuation notice for residents within a 1.5-mile radius of the plant. Three trucks exploded and burned. A few days later, emergency responders initiated a controlled burn of the remaining trucks. The explosions sent pillars of fire and thick plumes of black smoke into the sky, all captured in the media and displayed on local television news broadcasts.

## What can you do to better prepare?

As general counsel or senior EHS lawyer, one of your jobs is to help identify and mitigate risks. Experience matters—and the key is to avoid a “failure of imagination.” To be better prepared, you must consider:

- overall magnitude of the rain event
- impact of rain on specific elevation areas of plant
- hazards created
- placement of electrical power
- loss of electrical power—both primary and backup
- need to transfer chemicals in advance

Fortunately, there are hazard-assessment tools that you can use to identify and mitigate risks that stem from flooding.

### But first—some definitions

We often read or hear phrases such as “**100-year floodplain**” or “**500-year rainfall**.” But what do these phrases really mean? The answers, based upon statistics developed through the Federal Emergency Management Agency’s (FEMA) National Flood Insurance Program, may surprise you. A **100-year floodplain** is “an area of land that has a 1% chance of being inundated by flood waters from a bayou, stream, or creek in a given year.” Where does the water come from? Rainfall. Statistically, there is a 26 percent chance that a “**100-year rainfall**” will occur during any given 30-year time-period. In other words, there is about a 1-in-4 chance that you will see a flood before you pay off your mortgage.

What is a “**100-year rainfall**”? The threshold is different based upon where you live. According to the Harris County Flood Control District, the **100-year rainfall** level is 13 inches in 24 hours. The definitions for **500-year rainfall** and **500-year floodplain** in Harris County are similar. Statistically, within any 30-year time-period, there is a 6 percent chance that you will be flooded by 19 inches of rainfall in 24 hours.

Remarkably, parts of Harris County have had three **500-year rainfall** events in the last three years:

- the October 2015 Halloween flood;

- the April 2016 Tax Day flood; and
- the flood after Hurricane Harvey in 2017.

Clearly, the definition of *500-year rainfall* in Harris County must change. Noting that kind of change in a facility's disaster-planning practices is one way that you can be better prepared.

### **The Flood HAZOP**

With respect to flooding, the best advice you can give is to recommend a Flood HAZOP for each facility. HAZOP, which stands for "hazard and operability analysis," is one of many hazard identification and risk-analysis tools and addresses risk:

- What can go wrong? (hazard);
- How bad can it get? (consequence); and
- How often might it happen? (likelihood)

Your facility is likely performing HAZOPs in other areas—especially process areas—but is unlikely to have developed a flood-specific HAZOP. This activity likely best fits under facility siting review. Depending on your facility, you are already looking at blast analyses, overpressure contours, and building placements. Adding a formal risk assessment based on catastrophic flooding makes sense, too.

### **Some basics**

Consider engaging a civil engineer with experience in floodplain analysis to assist your company in this Flood HAZOP development process. They have the expertise necessary to evaluate technical flood maps, review elevations, and consider drainage issues. The HAZOP team should develop an objective approach that can be easily replicated and should include review of floodplain maps including FEMA's Base Flood Elevation and more detailed maps from FEMA's Flood Insurance Study. The team should also consider if flood risks threaten existing operations, if those operational units can be hardened against those risks, and if backup equipment should be moved to higher elevations within the facility.

Facilities should also add a flood plan to their site accident or emergency action plans. The flood plan should include:

- impacts from flood water inundating the plant;
- impacts from loss of utilities in the short- and long-term;

- impacts from loss of safety-critical equipment, such as Supervisory Control and Data Acquisition (SCADA) or Distributed Control Systems (DCS), which are electronic systems used to monitor and control plant processes;
- availability of manual operations and additional training required; and
- lead time required to shut down operations, move equipment, and move inventory.

## **Conclusion**

A Flood HAZOP and plan may not prevent authorities from commencing an investigation, but the documents—if done well—will certainly help investigators understand that you were thoughtful and prepared. Investigators understand that “sometimes terrible things happen to well-prepared companies.” What the investigators are searching for is evidence that your company identified the risks, took them seriously, and operated in a manner consistent with industry best practices to mitigate the risks.