

# **Texas Commission on Environmental Quality**



## **Senate Natural Resource and Economic Development**

Interim Charge – Environmental Safety: Study the strategies and best practices for ensuring environmental safety during maintenance, startup, and shutdown activities due to emergencies. Recommend actions to improve safety without compromising compliance or penalizing good actors.

September 5, 2018

## Witnesses:

1. Mike Wilson – Director, Air Permits Division
2. Kelly Cook – Director, Critical Infrastructure Division
3. Cynthia Gandee – Regional Field Support, Office of Compliance and Enforcement

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## **Mike Wilson – Director, Air Permits Division**

### ***Planned Maintenance, Startup, and Shutdown (MSS) – Authorized by Permit***

The TCEQ authorizes emissions from planned MSS activities. These are known and predictable or planned activities, see 30 Texas Administrative Code § 101.1(91) – Scheduled maintenance, startup, or shutdown activity. TCEQ's rules allow permit holders to reduce or increase emissions from routine and planned MSS activities if the permit holder demonstrates all rules are met, including the protection of human health and the environment; however, any emissions resulting from emergency or unplanned events would not be included in an authorization. For activities authorized by a permit, specific requirements may include, but are not limited to, emission limitations, control technology requirements, monitoring, recordkeeping, and possible operational limitations.

Owners and operators may seek increases in the maximum allowable emission limits when MSS is authorized or through an amendment to their already existing permit. Others may be able to authorize their MSS activities within their existing maximum allowable limits. In either case, permit representations include the duration and frequency of MSS activities and the magnitude and character of the emissions associated with those activities. When permitting MSS, owners and operators determine what MSS emissions are needed and then determine whether those limits may be accommodated within their existing permit limits. Permitted MSS may also include temporary facilities used to support planned MSS activities at permanent site facilities. In addition, the permit review includes an evaluation of off-property impacts for the emissions associated with the MSS activities.

If an owner or operator decides to initiate a shutdown activity in anticipation of an emergency event, for example a natural disaster, some maintenance or other activities could potentially be authorized by the permit. At a minimum, to be considered authorized, all of the applicable representations, emission limits, and special conditions for that activity must be met. This also includes the duration and frequency of MSS activities and the magnitude and character of the emissions associated with those activities.

## Kelly Cook – Director, Critical Infrastructure Division

### *Hurricane Harvey's Timeline and Devastation*

Hurricane Harvey made landfall on August 25, 2017 at 10:00 p.m. CT, as a Category 4 storm near Rockport, Texas and stalled over southeastern Texas. Due to its slow motion and a week-long period of onshore flow, more than 19 trillion gallons of rainwater fell on parts of Texas, causing catastrophic flooding.

In fact, Harvey was two separate and distinctly different disaster events:

- The category 4 hurricane that made landfall near Rockport, TX on August 25<sup>th</sup> with devastating hurricane winds, storm surge and heavy rainfall (6.23 inches in Corpus Christi and 17.08 inches in Victoria)<sup>1</sup>; and,
- The most significant tropical cyclone rainfall event in United States history that produced devastating rainfall and historic flooding along the Texas coast from Houston to Beaumont/Port Arthur with extremely heavy rainfall of 35 to 50+ inches. After making landfall, the storm then stalled over southeastern Texas with its center over or near the Texas coast for five days. The National Weather Service has indicated that in both scope and peak rainfall amounts, this was the largest rainfall event since reliable rainfall records began around the 1880s. The highest storm total rainfall report from Harvey was 60.58 inches near Nederland, Texas<sup>2</sup>.

When Harvey entered the Gulf of Mexico and re-formed into a Tropical Storm, the initial maximum rainfall forecast was for 20 inches in southeastern Texas. Several hours before Harvey made landfall the total rainfall forecasts were gradually increased to about 40 inches for southeastern Texas, which was roughly 24-36 hours before the heavy rains began in the Houston area. These totals were further raised to 50 inches about a day before the center of Harvey left Texas<sup>1</sup>.

#### Hurricane Harvey's Timeline

August 13<sup>th</sup> (Sunday) – **Becomes Tropical Wave/Off West Coast of Africa.** Harvey first developed as a tropical wave emerging off the west coast of Africa. Harvey started on a westward track for the first few days but remained a disorganized system;

August 17<sup>th</sup> (Thursday) – **Becomes Tropical Storm/Over Eastern Atlantic.** Harvey becomes better organized and become a tropical Storm;

August 18<sup>th</sup> (Friday) – **Tropical Storm/Over Windward Islands.** Tropical Storm Harvey impacted the Windward Islands and then entered the Caribbean Sea as a minimal tropical storm;

August 19<sup>th</sup> (Saturday) – **Tropical Wave/Over Caribbean.** Harvey weakens to a tropical wave. Although there was some potential for the remnants of Harvey to reorganize, it failed to reform into an organized system as it moved westward across the Caribbean Sea;

August 22<sup>nd</sup> (Tuesday) – **Remnants of Harvey/Over Yucatan.** The remnants of Harvey moved over the Yucatan Peninsula;

August 23<sup>rd</sup> (Wednesday) – **Tropical Depression/Over Gulf.** Harvey reforms into a Tropical Depression. Initially, National Hurricane Center believed Harvey would become either a strong tropical storm or a Category 1 hurricane before making landfall somewhere between Brownsville (early Friday morning) and Houston (early Saturday morning), with the most likely location near the Rockport area late Friday night<sup>1</sup>;

August 24<sup>th</sup> (Thursday) – **Category 1 Hurricane/Over Gulf.** Harvey becomes a Category 1 hurricane by late afternoon, but it was expected to strengthen and make landfall as a major hurricane (Category 3 or higher) on

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<sup>1</sup> [https://www.weather.gov/crp/hurricane\\_harvey](https://www.weather.gov/crp/hurricane_harvey)

<sup>2</sup> [https://www.nhc.noaa.gov/data/tcr/AL092017\\_Harvey.pdf](https://www.nhc.noaa.gov/data/tcr/AL092017_Harvey.pdf)

Friday near Copano Bay. Harvey is also forecast to eventually stall and meander over South or Southeast Texas for days;

August 25<sup>th</sup> (Friday) - **Category 4 Hurricane/First Landfall.** Harvey underwent rapid intensification and quickly became a Category 3 hurricane by midday and then further intensifying into a Category 4 hurricane (130 mph sustained winds) by early evening. Harvey makes landfall at 10:00 p.m. CT, as a Category 4 Hurricane in the Rockport/Fulton area, about 30 miles northeast of the city of Corpus Christi (Light/Moderate rainfall in Corpus Christi area<sup>3</sup>);

August 26<sup>th</sup> (Saturday) - **Tropical Storm/Meanders Over Land.** Hurricane Harvey continues moving slowly inland to the northwest towards Central Texas and is eventually downgraded to a Tropical Storm. The first flash flood emergency warning was issued at 9:27 p.m. CDT on August 26<sup>th</sup> for West Central Harris County, Eastern Fort Bend County, and Northern Brazoria County. With rainfall rates outpacing the drainage capabilities in Houston, significant urban drainage flooding occurred overnight<sup>4</sup> (Heavy rainfall in Corpus Christi, Houston and Beaumont/Port Arthur areas; Flooding in Houston area<sup>3</sup>);

August 27<sup>th</sup> (Sunday) - **Tropical Storm/Meanders Over Land.** Tropical Storm Harvey stalls over Gonzales County and begins to track back to the southeast towards the Gulf (Heavy rainfall in Houston and Beaumont/Port Arthur areas; Flooding in Houston area<sup>3</sup>);

August 28<sup>th</sup> (Monday) - **Tropical Storm/Re-enters Gulf.** Tropical Storm Harvey crosses Matagorda bay about 13 miles northeast of Port O'Connor and re-enters the Gulf (Heavy rainfall in Houston and Beaumont/Port Arthur areas; Flooding in Houston and Beaumont/Port Arthur areas<sup>3</sup>);

August 29<sup>th</sup> (Tuesday) - **Tropical Storm/Back Over Gulf.** Tropical Storm Harvey remains in the Gulf about 60 to 65 miles off the Texas coast as it slowly drifts to the northeast (Heavy rainfall in Houston and Beaumont/Port Arthur areas; Flooding in Houston and Beaumont/Port Arthur areas<sup>3</sup>);

August 30<sup>th</sup> (Wednesday) - **Tropical Storm/Second Landfall.** Tropical Storm Harvey makes a second landfall along the Louisiana Coast, about 25 miles east of Port Arthur, Texas (Heavy rainfall in Houston and Beaumont/Port Arthur areas; Flooding in Houston and Beaumont/Port Arthur areas<sup>3</sup>); and,

August 31<sup>st</sup> (Thursday) - **Tropical Depression/Stop Tracking.** Harvey becomes a Tropical Depression and moves northeast across Louisiana and Mississippi. The National Hurricane Center stops tracking Harvey (Moderate rainfall in Houston area; Heavy rainfall in Beaumont/Port Arthur areas; Flooding in Houston and Beaumont/Port Arthur areas<sup>3</sup>).

Major flooding from Hurricane Harvey resulted in many areas remaining inaccessible for days or weeks. The major flood conditions ended around September 10, 2017<sup>4</sup>.

#### Response and Preparedness Activities

In preparing for Hurricane Harvey's landfall the TCEQ prepositioned vital response equipment outside the forecasted impact zones to protect equipment and allow for a quick response to impacted areas as soon as storm/flood conditions allowed.

In responding to the devastation created by Harvey the TCEQ looked to its relationship with other state and federal partners through the Texas Natural Disaster Operational Workgroup (NDOW). NDOW was created to improve coordination between state and federal agencies during disasters, establish a framework of standard operational procedures, and most importantly to foster a strong multi-agency partnership.

As part of this coordination, a Unified Command was established between the TCEQ, the U.S. Environmental Protection Agency (EPA), the Texas General Land Office (GLO), and the U.S. Coast Guard (USCG) to oversee response efforts. This Unified Command was supported by three operational branches in Corpus Christi (Alpha Branch), Houston (Bravo Branch), and Port Arthur (Charlie Branch).

<sup>3</sup> [https://www.nhc.noaa.gov/data/tcr/supplemental/harvey\\_rain.xlsx](https://www.nhc.noaa.gov/data/tcr/supplemental/harvey_rain.xlsx)

<sup>4</sup> <https://www.weather.gov/media/publications/assessments/harvey6-18.pdf>

In addition to the TCEQ, the EPA, the GLO, and the USCG, multiple agencies and groups also supported each of the operational branches, including the Texas National Guard, Texas 6<sup>th</sup> Civil Support Team; the Arkansas National Guard, 61<sup>st</sup> Civil Support Team; the Oklahoma Task Force 1; and the Texas State Guard Engineering Group. Branch personnel worked to continuously monitor water and wastewater systems, as well as assess spills or discharges as a result of Harvey.

At the height of TCEQ's hurricane response efforts, approximately 500 TCEQ staff were involved in post hurricane landfall response activities. The TCEQ hurricane response activities included: (See Attachment 1, "Hurricane Harvey by the Numbers" for a complete overview of TCEQ Harvey related activities)

- Over 50 field teams were deployed daily throughout three (3) operational branches, which were responsible for covering 58 impacted counties;
- The field teams conducted Rapid Needs Assessments, Oil and Hazardous Materials Discharge Assessments and Recovery, Orphan Hazardous Materials Container Evaluations and Recovery, Public Water Supply System Infrastructure Assessments and Wastewater System Infrastructure Assessments, Debris Management Site Assessments, Dam Safety Assessments and Air Quality Monitoring; and,
- The TCEQ continued to lead hazmat operations for monitoring facilities that had reported spills or releases and in recovering orphan drums and containers, which were found in many of the waterways.

#### Air Monitoring Activities

Consistent with the TCEQ's Hurricane Preparedness Plan, air monitoring stations in areas threatened by Hurricane Harvey were taken offline and secured prior to landfall.

- In preparation for Hurricane Harvey's landfall, TCEQ air monitoring stations were taken offline in San Antonio, Corpus Christi, Houston, and Beaumont.
  - San Antonio - 4 stations off line as of August 23<sup>rd</sup>
  - Corpus Christi - 8 stations off line as of August 23<sup>rd</sup>
  - Houston - 26 stations off line as of August 24<sup>th</sup>
  - Beaumont - 14 stations off line as of August 24<sup>th</sup>
- Preparations included:
  - removal of all exterior equipment for storage;
  - lower all met towers and remove all wind sensors; and,
  - shut down power at all sites.
- Efforts to assess monitors for damage and bring them back online began:
  - San Antonio - August 28<sup>th</sup>;
  - Corpus Christi - August 30<sup>th</sup>;
  - Houston - August 31<sup>st</sup>; and,
  - Beaumont - September 2<sup>nd</sup>.
- All monitors not damaged by the storm (45 out of 52) were fully operational by:
  - San Antonio - August 28<sup>th</sup>;
  - Corpus Christi - September 2<sup>nd</sup>;
  - Houston - September 6<sup>th</sup>; and,
  - Beaumont - September 8<sup>th</sup>.
- The following TCEQ monitors/monitoring stations sustained damage:
  - Corpus Christi;

- National Seashore (particulate sampler)
- Houston; and,
  - Milby Park (full monitoring trailer replacement)
  - Houston East (full monitoring trailer replacement, electrical panel, particulate sampler)
  - Baytown (communications equipment)
- Beaumont.
  - City Service Center (VOC canister sampler replacement)
  - Port Arthur West (full monitoring trailer replacement, communications equipment)
  - Groves (VOC canister sampler replacement)
- Total of \$170,000 in damages to monitoring assets as a result of Harvey.
  - Total value of monitoring assets in hurricane impacted areas of approximately \$5.2 million.
- By September 29<sup>th</sup>, the seven stations damaged by the storm were repaired/replaced and the TCEQ's air monitoring network was restored to 100% operational.
- TCEQ's monitoring network data can be viewed through the GeoTAM website: <https://tceq.maps.arcgis.com/apps/webappviewer/index.html?id=ab6f85198bda483a997a6956a8486539>
- Once TCEQ collected data had been validated, it was made available on the TCEQ Hurricane Harvey response webpage. <https://www.tceq.texas.gov/response/hurricanes/hurricane-harvey>

Between the TCEQ and the EPA, multiple air monitoring assets were used to monitor air quality. As monitoring stations were being brought back online these efforts were focused on monitoring air quality in neighborhoods near industrial facilities:

- In a coordinated effort to monitor storm-impacted areas, both TCEQ and EPA investigators spent numerous hours, both day and night monitoring neighborhoods and industrial fence lines with hand-held instruments, such as optical gas imaging cameras (OGIC), toxic vapor analyzers, summa canisters, and portable multi-gas monitors. These tools provided the most effective way to quickly identify sources of drifting plumes so that swift action could be taken to address the cause of these emissions.
- Monitoring assessments of specific targets as well as broad areas of storm- impacted areas were conducted using optical gas imaging camera aerial surveys, EPA's Trace Atmospheric Gas Analyzer (TAGA) mobile monitoring system, and EPA's Airborne Spectral Photometric Environmental Collection Technology (ASPECT) aircraft.
  - The TAGA conducted monitoring in Houston (September 5<sup>th</sup> - 7<sup>th</sup> and September 10<sup>th</sup> -12<sup>th</sup>); Deer Park (September 14<sup>th</sup>); Baytown (September 15<sup>th</sup>); Sweeny and Texas City (September 17<sup>th</sup>); Beaumont, Port Arthur, Victoria, and Point Comfort (September 18<sup>th</sup>); and Corpus Christi (September 19<sup>th</sup> - 20<sup>th</sup>).
- In furthering efforts to monitor storm-impacted areas and address emission sources, the TCEQ conducted aerial surveys in the Houston and Beaumont areas using a helicopter equipped with an OGIC that can image VOCs and other hydrocarbons invisible to the eye. Investigators followed up with facilities to address potential sources of air emissions identified during the surveys. (Aerial surveys using the OGIC were not conducted in the Corpus Christi area since the major industrial areas did not experience impacts in the same manner or degree as those in the Houston and Beaumont areas.)
  - The OGIC helicopter conducted flyovers of the facilities impacted by the hurricane from on September 12<sup>th</sup> through September 15<sup>th</sup>.

- Flights over Ship Channel including Texas City, Baytown, and Cedar Bayou on September 12<sup>th</sup> and September 13<sup>th</sup>
  - Flights over Sweeney and Freeport on September 14<sup>th</sup>
  - Flights over Beaumont, Port Arthur, and Orange on September 15<sup>th</sup>
- From the available air monitoring data collected August 24<sup>th</sup> through September 24<sup>th</sup>, all measured air toxics concentrations were well below levels of health concern.



## Cynthia Gandee – Regional Field Support, Office of Compliance and Enforcement

### ***Introduction***

In preparation for Hurricane Harvey, refineries and chemical plants along the Texas Coast shut down or reduced their operations to prevent catastrophic failures that could occur due to weather or other limitations affecting their operations. Once an emergency is over, depending on the extent of the event, maintenance may be needed to make repairs before starting up the facility and resuming routine operations.

TCEQ staff reviewed maintenance, startup, and shutdown (MSS) events reported prior to and following Hurricane Harvey. Data is based on self-reported emissions from companies. Only those startup or shutdown activities that meet certain criteria are required to be reported to the TCEQ either before the event or shortly thereafter. TCEQ's review of information reported regarding startups and shutdowns during the period associated with Hurricane Harvey indicates that they occurred in stages and a summary of the data is included below.

### ***Overview of Authorization Emissions***

Emissions must be authorized in Texas, before construction is started on a facility. These authorizations cover routine operations but may also cover certain types of MSS. The Air Permits Division has further information on program specifics. When an emergency occurs, and a facility shuts down, there may be excess emissions, emissions that exceed a limit authorized by a TCEQ permit, rule or order. Excess emissions may occur as the facility clears lines and vents, idles down to a less efficient mode, or operates outside of the range where pollution controls are functional. Excess emissions may be caused by emergencies; negligent or intentional acts of the owner or operator; upsets or malfunctions; or due to unplanned MSS activities. TCEQ investigates instances of excess emissions and takes enforcement action when appropriate.

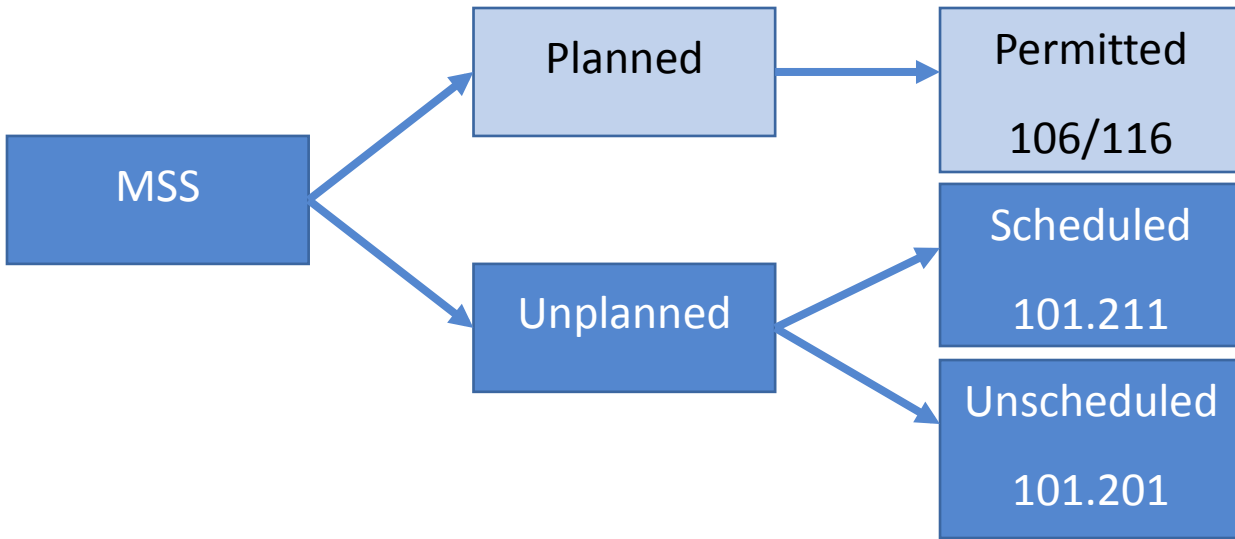
### ***Excess Emissions due to Emissions Events and Unplanned MSS***

In addition to authorized MSS, the TCEQ also regulates unplanned (unauthorized) emissions from MSS activities. Much like owning and operating a vehicle, there are some maintenance activities that are not planned like an oil change, but rather occur to prevent further damage or to restore operations. For air emissions from facilities, maintenance, and the startup and shutdown that may go along with it, can be *scheduled* or *unscheduled*. *Scheduled* MSS activities are those that are expected to exceed a reportable quantity (established in TCEQ rule<sup>5</sup>) in a 24-hour period and that the owner or operator notifies the agency 10 days or as soon as practicable prior to the activity.<sup>6</sup> *Unscheduled* MSS are those activities that are not authorized by a permit and were not reported to the agency prior to taking place. These two categories fall under different rules sets, and unscheduled MSS falls under a rule set with emissions events. An emission event also includes unplanned and unavoidable breakdowns or excursions that results in unauthorized emissions.

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<sup>5</sup> 30 Tex. Admin. Code § 101.1(89).

<sup>6</sup> See 30 Tex. Admin. Code § 101.211 and § 101.101(91).



## ***Reporting and Investigation of Excess Emissions***

Unplanned MSS events are violations but are eligible for the affirmative defense if they are reported properly. This incentivizes compliance with reporting requirements. An initial notification with estimated emissions is required and this may be revised in the final notification. After the final notification is received, the TCEQ will investigate of the reported emissions.

When TCEQ regional offices receive initial notifications prior to scheduled MSS, they may specify the amount, time, and duration of emissions that will be allowed during the scheduled MSS activity. The TCEQ regional office can also request a technical plan for any scheduled MSS activity. The plan must contain a detailed explanation of how emissions will be minimized during the activity. For those emissions that must be released into the atmosphere, the plan must include the reasons such emissions cannot be reduced further.

Reports of emissions events, or scheduled MSS events, are representative of a point in time, and may change as more information becomes available. Data are dynamic and, therefore, are subject to change as reports are updated by the regulated entity. An initial report contains estimated emissions released to the atmosphere and are required to be provided within 24 hours of discovery of an emissions event/unplanned MSS event. These emissions estimates are typically based on engineering calculations or experience, not on quantitative measurement data. Emissions estimates are generally provided in terms of pounds of pollutants or percent opacity rather than the impact of these emissions to ambient concentrations of pollutants.

Estimated emissions may be revised in the final report that is due two weeks from the end of the event after the entity has fully evaluated the incident. If emissions estimates do not change, investigators use the initial report for their evaluation. After the final report is received, the TCEQ investigates of the emissions event to determine compliance with applicable rules, and permits, including notification and reporting requirements. This review typically includes an evaluation of the accuracy, quantity, and any impact of the emissions event on human health or the environment.

Following Hurricane Harvey, certain rules were temporarily suspended to assist with recovery effort. The reporting requirements discussed in this paper were included with this suspension, but only to the extent the rules actually prevented, hindered or delayed necessary action in coping with the impacts of the disaster. The rules were to be complied with at the earliest opportunity available to the regulated entity. The suspension document specified that "regulated entities must prepare and maintain records related to the actions and suspended rules." As part of conducting routine investigations in areas impacted by the hurricane, TCEQ will continue to evaluate any incidents related to Hurricane Harvey. Any entity making an assertion that the hurricane caused a situation of noncompliance would have to demonstrate that meeting the requirement would have prevented, hindered or delayed necessary action in coping with the impacts of the hurricane and provide supporting records. TCEQ will evaluate instances where an entity may have taken longer to report certain events following Hurricane Harvey.

### ***Unplanned Events May Receive Enforcement Discretion If They Meet Affirmative Defense***

When excess emissions occur due to unplanned MSS activities or malfunctions, Texas reviews these events against criteria located in the MSS rules in the Texas Administrative Code to determine if the event was avoidable and assesses whether operators took measures to minimize emissions. The agency also has a set of criteria to categorize violations and a penalty policy to determine fines, both of which are available on the TCEQ website and can be viewed by the regulated community and the public.

The first step of the investigation is to determine whether or not the event was an excessive emissions event, which is a certain type of event where the TCEQ takes enforcement action. This determination is made based on 6 criteria relating to the frequency; cause; quantity and impact of emissions; duration; percentage of annual operating hours during which the emissions event occurred; and the need for MSS activities. To assess the quantity and impact on human health or the environment for excessive emissions events, air modeling of the emissions is conducted. The results are compared to standards, such as the National Ambient Air Quality Standards (NAAQS) and evaluated by TCEQ toxicologists. For unplanned MSS specifically, if the unauthorized emissions were caused by a bypass of control equipment, investigators consider whether the bypass was unavoidable to prevent loss of life, personal injury, or severe property damage. The following criteria are also considered when determining whether to take enforcement action:

TCEQ Regulations: Title 30, Texas Administrative Code, Chapter 101. Affirmative defense

- Reporting and recordkeeping
- Could not have been prevented by better operation, maintenance
- Control equipment was maintained and operated to minimize emissions
- Amount and duration were minimized
- Facility had no pattern of similar events
- Emissions cannot cause or contribute to an exceedance of the NAAQS or condition of air pollution

Texas continues to enforce permit limits and evaluate exceedances of those limits. Doing so is required by State and Federal law. Many investigations of emission exceedances are completed in-house as record reviews. These investigations allow Texas to evaluate compliance and the frequency of emissions more often than if a comprehensive on-site investigation was done for each event. The TCEQ's program for reporting excess emissions due to emissions events or unscheduled MSS is a very successful program, resulting in improved air quality. The reporting, together with the availability of an affirmative defense for these violations, allows for the prioritization of enforcement actions following the agency's review of these events and activities, and promotes preventive measures, proper monitoring and reporting, and prompt corrective actions as a response to those events. Excess emissions that occur for reasons other than an unavoidable excursion or MSS are not eligible for the affirmative defense and are considered for enforcement action. TCEQ carefully considers the facts of incidents of excess emissions when responding to citizen inquiries and complaints, and in evaluating events that are reported. This results in prompt and efficient enforcement actions, transparency to the public, and progress towards the goal of attainment of the NAAQS.

#### ***Hurricane Harvey MSS Events***

Because every event is unique, and every plant is unique, development of a "one size fits all" enforceable protocol or rules specifying measures for each plant, unit or facility to minimize adverse impacts of shutdown emissions due to a hurricane or similar event while ensuring safety of workers and surrounding areas would be a virtually impossible task. However, the rules currently in place require emissions to be minimized whether there is an emergency or not. The logistics of trying to plan the complete shutdown of numerous refineries and chemical plants over an area like the Houston Ship Channel in response to events such as hurricanes, while considering the amount of lead time each unit within a given site needs, and then basing these overall site lead times on the projected path and speed of a storm or flood event, would be extremely challenging. It would be equally as challenging to do the same for subsequent startups. While the TCEQ does not schedule the logistics of MSS activities across the state, the data show that they were spread over time.

Regions 10 (Beaumont), Region 12 (Houston), Region 14 (Corpus Christi)  
Event Start Date 8/25/2017 - 9/25/2017

Maintenance	Excess Opacity	Shutdown	Startup	Upset	Total
5	10	10	30	103	158

Scheduled Startup/Shutdown/Maintenance and Emissions Events Reported*							
Months	Start Date	Maintenance	Opacity	Shutdown	Startup	Upset	Grand Total
Aug	21-Aug					1	1
	22-Aug					2	2
	23-Aug		1			1	2
	24-Aug			6		6	12
	25-Aug		1			1	2
	26-Aug		1	1		4	6
	27-Aug		1	3		23	27
	28-Aug		3			6	9
	29-Aug			4	2	6	12
	30-Aug		1	1	2	6	10
	31-Aug	1	1			4	6
<b>Aug Total</b>		<b>1</b>	<b>9</b>	<b>15</b>	<b>4</b>	<b>60</b>	<b>89</b>
Sep	1-Sep	1			5	6	12
	2-Sep					2	2
	3-Sep				4	5	9
	4-Sep				6	2	8
	5-Sep				1	4	5
	6-Sep				2	1	3
	7-Sep	1			3	4	8
	8-Sep				1	1	2
	9-Sep					5	5
	10-Sep				1	2	3
<b>Sep Total</b>		<b>2</b>			<b>23</b>	<b>32</b>	<b>57</b>
<b>Grand Total</b>		<b>3</b>	<b>9</b>	<b>15</b>	<b>27</b>	<b>92</b>	<b>146</b>

<b>Duration (days) *</b>	<b>Total</b>	<b>27-Aug-17</b>	
0	48	<b>COUNTY</b>	<b>Number of Incidents</b>
1	29	ATASCOSA	1
2	12	BRAZORIA	4
3	5	CHAMBERS	2
4	2	GALVESTON	1
5	7	GRIMES	1
6	3	HARRIS	14
7	4	JEFFERSON	2
8	6	LIVE OAK	1
9	1	WASHINGTON	1
10	3	<b>Grand Total</b>	<b>27</b>
11	3		
12	7		
13	3	<b>Harris County 27-Aug-17</b>	
14	1	<b>City</b>	<b>Total (pounds)</b>
16	1	BAYTOWN	976,854
17	1	HOUSTON	235,412
18	2	PASADENA	162,830
23	1	DEER PARK	67,934
31	1	LA PORTE	3,907
36	1	<b>Grand Total</b>	<b>1,446,936</b>
50	1		
<b>Weighted Average</b>	<b>6</b>		

\*Events with a start date 21-Aug-17 through 10-Sept-17 in 60 disaster declaration counties

In the days surrounding Hurricane Harvey, the reported emissions from unplanned or scheduled MSS events were distributed over time and geographically. In an effort to assess the concentration of events, data for reports with a start date between August 25 and September 25, 2017 were reviewed. During this time, most events occurred between August 21 and September 10, 2017. The day with the most incidents was August 27, 2017. The events occurred over nine counties, with Baytown having the highest concentration of emissions. In Baytown, nearly half of the emissions were products of combustion, carbon monoxide and nitrogen oxide, which can occur as pollution control devices combust other types of pollutants.

The goal of the air quality program is better air quality, and the goal of the compliance and enforcement program is compliance. Enforcement is a tool that is used when appropriate. While Texas continues to grow in terms of population and economic activity, there are many air quality successes that include a downward trend in ambient concentrations of pollutants of concern in some areas. Conducting maintenance at large complex facilities that operate under high pressure and temperatures to refine everyday products is necessary

to prevent future process breakdowns and contributes to this success. TCEQ has been provided with adequate enforcement authority and tools to ensure accountability. Statutes<sup>7</sup> and rules<sup>8</sup> incentivize reporting and corrective actions. Regulations also address issues such as frequency and investigators look for patterns in terms of causes and the percentage of operating time units are in upset mode. This means that TCEQ is interacting with companies, reviewing operating and maintenance records, and providing oversight routinely when companies have emissions releases. TCEQ recognizes that these standards were designed to protect human health and the environment, and this is a key part of our mission. While TCEQ continues to pursue improvements in air quality, there are also numerous other agencies that regulate emergency conditions and may require different types of plans to be in place. A sample of these regulations is listed below.

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<sup>7</sup> Texas Health and Safety Code Sec. [382.0215](#) and [382.0216](#)

<sup>8</sup> Title 30 of the Texas Administrative Code, Chapter 101, [Subchapter F](#)

## Planning Requirements

Type of Planning	Applicability	Links
<b>Tier II Chemical Reporting Program</b>	Storage of certain chemicals over thresholds	<b>State Emergency Response Commission</b> <a href="https://www.tceq.texas.gov/response/serc.html">https://www.tceq.texas.gov/response/serc.html</a> <b>Tier II Chemical Reporting Program</b> <a href="https://www.tceq.texas.gov/permitting/tier2/about-tier-2.html">https://www.tceq.texas.gov/permitting/tier2/about-tier-2.html</a>
<b>Risk Management Plan (RMP)</b>	Using more than threshold quantity in a process	<b>RMP Rule Overview</b> <a href="https://www.epa.gov/rmp/risk-management-plan-rmp-rule-overview">https://www.epa.gov/rmp/risk-management-plan-rmp-rule-overview</a> <b>Risk Management Plan (RMP) Policies and Fact Sheets</b> <a href="https://www.epa.gov/rmp/risk-management-plan-rmp-policies-and-fact-sheets">https://www.epa.gov/rmp/risk-management-plan-rmp-policies-and-fact-sheets</a>
<b>Facility Response Plans (FRP)</b>	Store large quantities of oil that could cause substantial harm	<a href="https://www.epa.gov/oil-spills-prevention-and-preparedness-regulations/facility-response-plan-frp-overview">https://www.epa.gov/oil-spills-prevention-and-preparedness-regulations/facility-response-plan-frp-overview</a>
<b>Spill Prevention, Control and Countermeasure (SPCC) Rule</b>	Store hydrocarbon that could enter water bodies	<a href="https://www.epa.gov/oil-spills-prevention-and-preparedness-regulations/overview-spill-prevention-control-and">https://www.epa.gov/oil-spills-prevention-and-preparedness-regulations/overview-spill-prevention-control-and</a>
<b>Stormwater Pollution Prevention Plan</b>	Construction sites where pollution may enter stormwater	<a href="https://www.epa.gov/npdes/developing-stormwater-pollution-prevention-plan-swppp">https://www.epa.gov/npdes/developing-stormwater-pollution-prevention-plan-swppp</a>



## Appendix A - Resources Available

- **Emergency Response** - <https://www.tceq.texas.gov/response>
- **Responding to an Incident** - <https://www.epa.gov/emergency-response/responding-incident>
- **Emergency Planning and Response Authorities** - <https://www.epa.gov/emergency-response/emergency-planning-and-response-authorities>
- **National Contingency Plan (NCP)** - <https://www.epa.gov/emergency-response/national-oil-and-hazardous-substances-pollution-contingency-plan-ncp-overview>
- **Area Contingency Planning** - <https://www.epa.gov/oil-spills-prevention-and-preparedness-regulations/area-contingency-planning>
- **Oil Pollution Act (OPA)** - <https://www.epa.gov/laws-regulations/summary-oil-pollution-act>

## Appendix B – Hurricane Harvey by the Numbers

### Temporary Debris Management Sites (TDMS)

#### TCEQ TDMS Tracking

- There are 232 Texas Commission on Environmental Quality (TCEQ) approved TDMSs, with 7 remaining active;
- The TCEQ has conducted 2,349 TDMS inspections; and,
- The estimated current total amount of debris at the TCEQ-approved TDMSs is 51,065 cubic yards.

#### Estimated Amount of Debris Collected Areawide

- The Texas Division of Emergency Management (TDEM) and Federal Emergency Management Agency (FEMA) have reported the revised total quantity of estimated debris from Hurricane Harvey is 13,251,124 cubic yards;
- The estimated quantity of debris removed is 12,989,783 cubic yards; and,
- The estimated percent complete to date is 98%<sup>9</sup>.

**10% Local Cost Share:** On November 13, 2017, Governor Greg Abbott along with the Texas Legislature made available to TCEQ an emergency appropriation of up to \$90 million from the Solid Waste Disposal Fees Account (Account No. 5000) to help alleviate the cost burden for debris removal in disaster-declared counties. This Emergency Funding was provided to assist local governments pay their local (non-federal) FEMA cost share (up to 10%) for debris removal costs.

On December 12, 2017 the TCEQ entered into a Cooperative Reimbursement Contract (grant) with TDEM who is the administering party for distributing the funds.

As of August 17, 2018, TDEM has obligated \$30.95 million to local governments. A total of \$15.32 million has been distributed in advance payments (50% payment upfront), with the remainder due when work is complete.

**Figure 1**

TCEQ Region	Number of Approved TDMSs	Number of Approved TDMSs Still Active	Number of Inspections at TDMSs	Current Volume (cy) of Debris at TDMSs
<b>R9 Waco</b>	2	0	4	0
<b>R10 Beaumont</b>	21	0	329	0
<b>R11 Austin</b>	6	0	12	0
<b>R12 Houston</b>	108	1	993	5,987 cy

<sup>9</sup> The daily DASHBOARD - Debris Situation Report from TDEM, dated August 23, 2018.

<b>R13 San Antonio</b>	3	0	8	0
<b>R14 Corpus Christi</b>	92	6	1,003	45,078 cy
<b>Totals</b>	<b>232</b>	<b>7</b>	<b>2,349</b>	<b>51,065 cy</b>

### ***TCEQ Air Monitoring Network***

The TCEQ used every appropriate means of air monitoring available to support our mission to protect human health and the environment.

One of the many preparations for Harvey included the TCEQ, the U.S. Environmental Protection Agency (EPA), and other monitoring entities temporarily shutting down several air monitoring stations from the greater Houston, Corpus Christi, and Beaumont areas to protect valuable equipment from storm damage.

After the storm passed, TCEQ staff and contractors began conducting damage assessments of monitoring stations and bringing monitors back online as soon as possible. Monitoring stations not damaged from Harvey were back to operational status in Corpus Christi, Houston, and Beaumont by September 2<sup>nd</sup>, 6<sup>th</sup>, and 8<sup>th</sup>, respectively.

By September 29<sup>th</sup>, the stations damaged by Harvey were repaired or replaced and the TCEQ's air monitoring network was restored to 100% operational status.

Also, in a coordinated effort to monitor storm-impacted areas, both TCEQ and EPA investigators spent numerous hours, both day and night, monitoring neighborhoods and industrial fence lines with hand-held instruments, such as optical gas imaging cameras (OGIC), toxic vapor analyzers, summa canisters, and portable multi-gas monitors. The use of these tools allows for the most effective source identification for drifting volatile organic compound (VOC) plumes so that swift action can be taken to address the cause of these emissions.

Additional Harvey related air monitoring activities included:

- TCEQ conducting aerial surveys in the Houston and Beaumont areas using a helicopter equipped with an OGIC that can image VOCs and other hydrocarbons invisible to the eye;
- EPA's Airborne Spectral Photometric Environmental Collection Technology (ASPECT) aircraft conducted real-time sampling of potential emission targets over facilities impacted by Harvey; and,
- EPA's Trace Atmospheric Gas Analyzer (TAGA) mobile monitoring system conducted air quality analyses in neighborhoods surrounding facilities impacted by Harvey.

The results from the available air monitoring data collected from August 24<sup>th</sup> through September 24<sup>th</sup>, (i.e. continuous air monitors, hand-held instruments, ASPECT and TAGA) all measured air toxics concentrations below levels of health concern.

### ***Drinking Water and Waste Water***

**Public Water System (PWS) Community Water Systems Tracking:** (58 Counties within the Governor's Disaster Declaration)

- 2,238 PWS community water systems that serve a population of approximately 11 million people are being tracked;

- At the Peak, 61 PWS community water systems were inoperable on August 31<sup>st</sup> and September 4<sup>th</sup>, serving a population of 222,821 people; and,
  - Conducted 625 on-site drinking water assessments.
  - All but 1 PWS System Restored and Operational.
    - BAREFOOT RV PARK - This PWS community water system was destroyed and will not be rebuilt. The owner of Barefoot RV Park is currently working on interconnecting to another system.
- At the Peak, 203 of the PWS community water systems had issued a boil water notice (BWN) on September 1<sup>st</sup>, serving a population of 376,245 people.
  - All Harvey related BWNs have been rescinded.

**Inoperable Wastewater Facility Tracking:** (58 Counties within the Governor's Disaster Declaration)

- 1,743 Domestic & Industrial Wastewater Facilities are being tracked that serve a population of approximately 10 million people; and,
- At the Peak, 40 Wastewater Facilities were non-operational on September 7<sup>th</sup>, serving a population of 168,816 people.
  - Conducted 441 on-site wastewater assessments.
  - All Harvey impacted facilities are operational.

**Additional Activities for Drinking Water/ Wastewater Assessments:**

- Worked through NDOW process to assess Public Drinking Water and Wastewater Systems;
  - Provided data to include in the Response Manager Database System.
  - Contacted drinking water and wastewater systems to determine operational status and provide technical assistance if needed.
  - Conduct on-site assessments for systems with no phone contact.
- Refer drinking water and wastewater systems to the TCEQ representative at the State Operations Center (SOC); and,
  - Work with drinking water and wastewater systems to request resources through their local officials or mutual aid.
    - Public Works Response Team (PWRT) - volunteers from public works that can be assigned to impacted areas, such as the Rio Grande Valley PWRT.
    - Texas Water/Wastewater Agency Response Network (TXWARN) - assists water and wastewater systems during emergencies through mutual aid through their large network of water systems.
    - Texas Chemical Council - found locations for water systems to purchase chemicals.
- Going forward TCEQ, PWRT and TXWARN will develop a plan to coordinate response activities to reduce duplication of effort.

**Sanitary Sewer Overflows:** The agency actively worked to monitor facilities that reported spills. Texas wastewater facilities are prepared for increased inflows during heavy rainfall events. However, the magnitude and the nature of the record-setting flooding from Hurricane Harvey impacted facilities in a way that they could not respond to operationally. Entire wastewater facilities were inundated with floodwater, including many that were underwater for an extended period of time, resulting in record sanitary sewer overflows (SSOs). An SSO is a type of unauthorized discharge of untreated or partially treated wastewater from a collection system or its components (e.g., a manhole, lift station, or cleanout) before it reaches a wastewater treatment facility.

Some discharges originally reported to the TCEQ were later determined to be industrial discharges, rather than an SSO; therefore, the format of the Tracking Report was modified on October 9<sup>th</sup> to provide for separate reporting of these two types of discharges.

To put in perspective the 22.5 million gallons of SSOs reported to the TCEQ, as of October 10<sup>th</sup>, by wastewater facilities in the impacted areas, the SSOs equate to less than one percent (0.00012 percent) in volume of the 19 trillion gallons of rainwater that caused the extreme flooding that impacted these same Texas facilities.

## ***Hazardous Materials***

### Hazardous Material Recovery and Response Operations

- Hazardous material orphan drum and container recovery operations have been completed;
- Hazardous material spill/release response and cleanup activities have been completed;
- To date, 1,155 hazmat orphan drums and containers have been recovered; and,
- To date, 266 spills or discharges reported or observed have been responded to appropriately.

The Unified Command formed by TCEQ, EPA, Texas General Land Office, and the U.S. Coast Guard helped to more efficiently utilize everyone's resources to ensure that orphan drum and container recovery operations and the spill/release response and cleanup activities were conducted timely, efficient, and minimize threats to human health and the environment.

To identify hazardous material concerns, the unified command deployed teams to conduct reconnaissance and assessments for orphan drums and containers and assess facilities to locate any spills or releases. and responded to accordingly. The Unified Command then responded to address all hazardous material concerns identified.

Orphan containers, which include drums and tanks, found floating in or washed up near waterways were gathered by Unified Command, where crews sorted and grouped items by type and conducted any necessary sampling, prior to shipping them off for safe, proper treatment and disposal.

## ***Superfund***

### **17 State Superfund Sites in the Impacted Area:**

- TCEQ completed assessments at all 17 state Superfund sites in the affected areas; and,
- Based on the assessment and sampling, all sites have been cleared.

### **34 Federal Superfund Sites in the Impacted Area:**

- EPA completed site assessments at all 34 Superfund sites in the affected areas; and,
- Based on the assessment and sampling, 33 have been cleared.
  - The San Jacinto Waste Pits site was found to have damage to its cap which required repairs and additional follow up. EPA has been working with potential responsible parties on the necessary repairs and sampling at the site. EPA's selected remedy of removal of the contaminated material is described in the Record of Decision, which was signed on October 11, 2017.

## ***Cost***

FEMA authorized TCEQ to receive assistance from EPA, totaling \$15 million, to conduct field operations. TCEQ anticipates \$330,000 as the cost share portion of this response; and,

TCEQ Anticipated costs for response efforts: \$1,055,600.

- The TCEQ will seek reimbursement from FEMA's public assistance program for the eligible portion of these costs, estimated to be \$630,000.