PUBLICCITIZEN
309 East 11th St., Suite 2 • Austin, Texas 78701 • 512.477.1155 • www.citizen.org

To the members of the House Committee on Environmental Regulation.
Via hand delivery. May 3, 2021

Re: HB 2780 by Rep. Paddie - Testimony by Public Citizen

Dear Chairman Landgraf and members of the committee:

Public Citizen appreciates the opportunity to testify on HB 2780 by Chairman Paddie, relating to the safety of aboveground storage tanks.

Much of this testimony is identical to the testimony we offered on SB 900, and specifically the committee substitute to that bill, in the Senate Committee on Natural Resources and Economic Development. SB 900 has passed the Senate and been received by the House.

HB 2780 is the companion to SB 900. Passing it quickly out of this committee is an important step toward passing legislation on petrochemical storage tank safety.

I. Recommendations for HB 2780

We appreciate Chariman Paddie for filing this bill and this committee for taking it up. We have the following recommendations for strengthening the bill.

A. Expand the objective of the bill.

SECTION 1 of the bill states that its objective is "protecting groundwater and surface water resources in the event of accidents and natural disasters." This objective should be expanded to include protection of the health and safety of workers and nearby communities, and the minimization of air pollution emissions.

B. The definition of "national consensus standards" should be revised, as API standards have not considered diverse views.

SECTION 2 of the bill defines "national consensus standard" as performance standards for which:

- "persons interested and affected by the scope or provisions of the standard have reached substantial agreement on its adoption" (p.3, l.19-20.); and
- "was formulated in a manner which afforded an opportunity for diverse views to be considered." (p.3, l.21-22.)

The national consensus standards referred to in the bill are all American Petroleum Institute (API) standards, including chapters 650 and 653, with which we are familiar.

PUBLICCITIZEN
309 East 11th St., Suite 2 • Austin, Texas 78701 • 512.477.1155 • www.citizen.org

We do not believe that API standards meet the bill's definition of a "national consensus standard." We are not aware of any consideration of diverse views in the adoption of API standards. Most API standards were promulgated decades ago. There is no indication that they meet modern standards for consideration of diverse stakeholder input or were adopted with substantial agreement of person affected.

As evidence for this deficiency, the "Get Involved" section of the API's website requests participation only from industry professionals and experts.[1]

The API does have a "Minority Serving Institutions (MSI) Initiative." It is an effort to provide access to API standards to Historically Black Colleges and Universities (HBCUs) and other Minority Serving Institutions.[2]

While this effort to provide access is laudable, there is no evidence that API is seeking input from HBCUs or MSIs—or indeed any minority voices—in the adoption of standards.

We recommend the following language for subsection (7-A) of the bill:

> (7-a) "National consensus standards" means any performance standard for aboveground storage tanks, or a modification thereof, which has been adopted and promulgated by a nationally recognized standards-producing organization.

The current definition of "national consensus standards" would sanction those standards in a way that they do not deserve. In the future, the API and other national standards organizations should adopt standards via a process that meets contemporary criteria and values for diverse stakeholder inclusion.

C. Implement the recommendations by the Sierra Club in its testimony on H 2780.

We agree with and affirm the recommendations by the Sierra Club:

1. Expand the bill to include all aboveground storage tanks with capacity of at least 10,000 gallons and including more types of chemicals.
2. Create the Storage Performance Standard Program by September 1, 2022.
3. Move the compliance date for existing tanks to September 2, 2023, with recertification every five years thereafter.
4. Conduct inspections every two years jointly with the county fire marshal.
5. Strict enforcement of performance standards with expanded penalties.

---

[1] *See* https://www.api.org/products-and-services/standards/get-involved.
[2] *See* https://www.api.org/products-and-services/standards/msi-initiative.

D. Implement a requirement to construct tanks to withstand larger volumes of rain.

This recommendation is discussed in Section II below.

E. Consider Chemical Safety Board recommendations.

This recommendation is discussed in Section III below.

II. Hurricane Harvey revealed tanks' vulnerability to heavy rain.

The most significant failure of storage tanks in recent years was during Hurricane Harvey in 2017. That storm, and its unprecedented volume of rain, revealed a previously unknown vulnerability of storage tanks.[3]

A. Tank failures during Harvey

At least nine companies experienced storage tank failures due to excessive rain during Hurricane Harvey. These incidents combined released more than three million pounds of air pollution. A summary of these events as reported to the TCEQ's Air Emissions Event Reporting Database is below.

Incident Number[4]	Company	Pollution released (lbs)	Cause
267578	Arkema Crosby Plant	23,608	Two tanks capacity exceeded, spill into containment dike, dike leak into floodwaters.
267063	Crude Product Port Neches	1,368	Product on internal floating roof.
266294	ExxonMobil Baytown Refinery	185,808	Partial roof submergence.
266754	Galena Park Terminal	2,471,401	Two tanks floated and released contents into floodwater.
266570	Marathon Petroleum Texas City Refinery	7,927	Tilting roof due to excessive rain.
266263	Phillips 66 Pasadena Product	119	Two external floating roof tanks experienced product draining into secondary

[3] Jordan Blum, "Failure of floating-roof oil tanks during Harvey raise concerns" Houston Chronicle (11 Oct. 2017) *available at https://www.houstonchronicle.com/business/energy/article/Failures-of-floating-roof-tanks-during-Harvey-12269513.php. See also as attached.*

[4] Events reports retrieved from the TCEQ's Air Emissions Event Reporting Database at https://www2.tceq.texas.gov/oce/eer/ (9 Jan 2021).

	Terminal		containment.
266269	KM Liquids Pasadena Terminal	144,601	Partial submergence of two external floating roofs.
266266	Shell Oil Deer Park	67,933	Contents spilled on tank roof, "cause unknown."
266275	Valero Partners Houston	235,412	Partial sinking of tank roof.
	TOTAL	**3,138,177**	

The House Committee on Environmental Regulation held a hearing on April 25, 2018 to hear testimony on Harvey response and cleanup efforts.[5] At that hearing testimony was given by, among others, Harris County Pollution Control Services Director Bob Allen.[6]

Mr. Allen testified about a weakness in the design of floating roof tanks in Harris County. There are roughly 400 external floating roof tanks in Harris County. The county identified nine tank failures during Harvey and questioned the tank owners about a cause. Some companies responded that the drains on the roofs of their floating roof tanks were too small. Mr. Allen testified that while industry standard is a four-inch drain, companies with six-inch drains on their tanks did not experience tank failures during Harvey, even after forty-five inches of rain.

In his testimony, Mr. Allen recommended that new tanks be required to have larger drains, and that existing tanks could be required to enlarge their tank drains during their next turnaround.

The drain size of floating roof tanks is not proscribed by TCEQ,[7] which does not maintain construction standards for oil and gas infrastructure. The controlling authority is American Petroleum Institute Standard 650: "Welded Tanks for Oil Storage" API STANDARD 650, ELEVENTH EDITION, JUNE 2007 (citing 40 CFR 195.132(b)(3), Design and construction of aboveground breakout tanks).[8]

API 650 speaks to floating roofs, raining, and drains twice, specifically:

> "Floating roofs shall have sufficient buoyancy to remain afloat…for the following conditions: (a) 250 mm (10 in.) of rainfall in a 24-hour period" API 650, C.3.4.1 (2007).

---

[5] *See* https://capitol.texas.gov/tlodocs/85R/schedules/pdf/C2602018042509001.PDF.
[6] *Mr. Allen's testimony begins at 2:34:00* http://tlchouse.granicus.com/MediaPlayer.php?view_id=40&clip_id=15092.
[7] *See* 30 TAC 115.112.
[8] 40 CFR 195.132(b)(3), "Vertical, cylindrical, welded steel tanks with internal pressures at the tank top approximating atmospheric pressures…must be designed and constructed in accordance with API Standard 650."

> "Emergency Roof Drains…shall be sized to handle the rainfall specified by the Purchaser." API 650, C.3.8.2 (2007).

API 650 says nothing about roof drain sizes of four inches or otherwise.

The guideline to construct for "10 in. of rainfall in a 24-hour period" is out of date. API 650 relies for its rainfall estimates on Technical Paper-40,[9] which in turn relies on rainfall data from 1961 and before.[10]

Houston has experienced ten storms of ten inches or more in the last twenty years:

Date	Storm	Rainfall	Frequency	Fatalities	Damage (est.)
Aug. 27, 2020	Hurricane Laura[11]	10-15"	25 year	42	$19 billion
Sept. 19, 2019	T. S. Imelda[12]	24-36"	100 year	5	$5.1 billion
Aug. 27-29, 2017	Hurricane Harvey[13]	60.5"[14]	100 year	89	$125 billion
Apr. 18, 2016	*Tax Day Flood*[15]	17"	100 year	8	$2.9 billion
Oct. 31, 2015	*Halloween Flood*[16]	10-15"	25 year	2	$30 million
May 25, 2015	*Memorial Day Flood*[17]	10"	25 year	31	$2.8 billion
July 14, 2012	n/a[18]	10"	25 year	-	-
Apr. 28, 2009	n/a[19]	10"	25 year	1	-
Sept. 13, 2008	Hurricane Ike[20]	11"	25 year	112	$36.9 billion
June 8, 2001	T. S. Allison[21]	30-40"	100 year	43	$12.7 billion

[9] Hershfield, David M. "Technical Paper 40: Rainfall Frequency Atlas of the United States" U.S. Department of Commerce, Weather Bureau (May 1961) *available at* https://www.nws.noaa.gov/oh/hdsc/Technical_papers/TP40.pdf ("TP40").
[10] *See* API Standard 650 at 2-4.
[11] NOAA National Centers for Environmental Information (NCEI) U.S. Billion-Dollar Weather and Climate Disasters (2021). https://www.ncdc.noaa.gov/billions/, DOI: 10.25921/stkw-7w73.
[12] *Ibid.*
[13] *Ibid.*
[14] "National Hurricane Center Tropical Cyclone Report: Hurricane Harvey" (9 May 2018) *available at* *https://www.nhc.noaa.gov/data/tcr/AL092017_Harvey.pdf*.
[15] *Ibid note 11.*
[16] *See* *https://www.weather.gov/media/hgx/climate/summary/2010Top10.pdf*.
[17] *Ibid note 11.*
[18] *See* *https://www.cbsnews.com/news/100-year-rainfall-event-drenches-houston-area/*.
[19] *See* *https://www.weather.gov/hgx/pns_memorable_events2000s*.
[20] NOAA National Centers for Environmental Information (NCEI) U.S. Billion-Dollar Weather and Climate Disasters (2021). https://www.ncdc.noaa.gov/billions/, DOI: 10.25921/stkw-7w73.
[21] NOAA National Centers for Environmental Information (NCEI) U.S. Billion-Dollar Weather and Climate Disasters (2021). https://www.ncdc.noaa.gov/billions/, DOI: 10.25921/stkw-7w73.

B. Tank failures before Harvey

Hurricane Harvey was the first time that the systemic weakness of petroleum storage tanks to high volumes of rain was recognized. There had, however, been similar incidents previously reported to the TCEQ. During the April 18, 2016 "Tax Day Flood," the Nustar Logistics Texas City Crude Tank Farm experienced an emissions event totaling 5,136 pounds due to tank drain failures. Tank 84 was in service and experienced the plugging of its side drains. Tank 85 was not in service but suffered from a bad roof drain.[22]

During the "Memorial Day Flood" of May 25-26, 2015, two reported incidents were directly attributed to rainfall. At the Phillips 66 Pasadena Product Terminal, Tank 120 released 3,238 pounds of pollution due to a floating roof drain failure.[23] Nine inches of rain fell overnight, leading to a drain clog likened to "leaves clogging a rain gutter." This led to water accumulation on the roof, followed by the sinking of one side of the external floating roof into the gasoline stored within. The gasoline floated on top of the rain on the tank roof and was released into the air.

Also during the Memorial Day Flood, the Magellan Pipeline Terminals East Houston Tank Farm released 34,836 pounds of pollution from Tank 1222. Eleven inches of rain caused the external floating roof tank to become submerged, forcing product onto the roof.[24]

C. Recommendation: A new standard for tank roof draining.

H 2780's reliance on API standards will not protect tanks from future storms with high volumes of rain. We recommend a new standard, perhaps one based on a larger roof drain size as Mr. Allen suggested in his 2018 testimony. Another option is to require geodesic roof tanks in areas prone to heavy rains.

III. Consider recommendations from the Chemical Safety Board regarding tank explosions and fires.

A March 17, 2019 fire at the Intercontinental Terminals Facility in Deer Park, TX led to fire that burned for days. This incident revealed a number of shortcomings at the facility including: [25]

- Lack of remote emergency shutoff valve.

---

[22] *See* https://www2.tceq.texas.gov/oce/eer/index.cfm?fuseaction=main.getDetails&target=231845.
[23] *See* https://www2.tceq.texas.gov/oce/eer/index.cfm?fuseaction=main.getDetails&target=214703.
[24] *See* https://www2.tceq.texas.gov/oce/eer/index.cfm?fuseaction=main.getDetails&target=214682.
[25] U.S. Chemical Safety and Hazard Investigation Board "Storage Tank Fire at Intercontinental Terminals Company, LLC (ITC) Terminal" (30 Oct. 2019) *available at* https://www.csb.gov/assets/1/20/itc_factual_update_2019-10-30.pdf?16522. *See also* Perla Trevizo, "Report ITC did not have emergency shutoff valve or alarm before massive blaze" Houston Chronicle (30 Oct. 2019) *available at* https://www.houstonchronicle.com/news/houston-texas/houston/article/Report-ITC-did-not-have-emergency-shutoff-valve-14584762.php.

- Lack of alarm to alert workers.
- Failure of tank farm dike wall.

Furthermore, the perfluoroalkyl and polyfluoroalkyl, or "PFAs," chemicals used to fight the fire contaminated a nearby waterway.[26] These chemicals are highly toxic and do not break down in the environment.

We recommend a review of the Chemical Safety Board's report on this and similar incidents and new performance standards to address the vulnerabilities identified. We also recommend a transition away from the use of PFAs chemicals to fight fires, although that recommendation is outside the scope of this legislation.

In conclusion, HB 2780 is a good first step toward addressing vulnerabilities in Texas' aboveground storage tanks. We believe that more is needed, including these recommendations, to further protect workers and neighboring communities.

I appreciate the opportunity to provide these comments and welcome questions at ashelley@citizen.org, 512-477-1155.

Respectfully,

Adrian Shelley
Texas office director

CC: Rep. Alex Dominguez, Rep. Jay Dean, Rep. Vikki Goodwin, Rep. Kyle J. Kacal, Rep. John Kuempel, Rep. Penny Morales Shaw, Rep. Geanie W. Morrison, Rep. Ron Reynolds

Attachments:
Jordan Blum, "Failure of floating-roof oil tanks during Harvey raise concerns" Houston Chronicle (11 Oct. 2017).

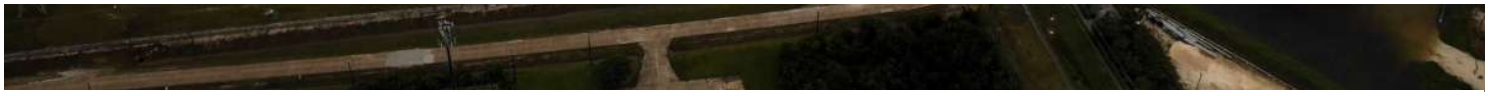
[26] Perla Trevizo, "Hazardous chemicals remain in water long after ITC fire" Houston Chronicle (4 Nov. 2019) *available at https://www.houstonchronicle.com/news/houston-texas/houston/article/Environmental-impacts-of-ITC-fire-to-be-presented-14806393.php*.

BUSINESS // ENERGY

Failures of floating-roof oil tanks during Harvey raise concerns

Jordan Blum

Updated: Oct. 12, 2017 12:27 a.m.



1 of 6

Large storage tanks in retention ponds are surrounded by rainwater left behind by Tropical Storm Harvey on Aug. 30, 2017, at ExxonMobil's refinery in Baytown.

Tom Fox/MBR

As Hurricane Harvey swept across the Houston area, torrential waves of rain built on top of crude oil storage tanks at Valero Energy's Houston refinery, causing one of the roofs that float atop the oil to flip almost on its side and release more than 235,000 pounds of toxic vapors and other pollutants into the atmosphere.

The collapse at Valero was one of more than 15 floating roof storage tanks that failed during the record-setting storm, allowing a combined 3.1 million pounds of volatile chemicals to spew into the air across the region, according to reports the companies filed with environmental agencies. This series of failures, along with the breakdown of drainage systems designed to funnel water off the roofs, exposed the vulnerabilities of floating roof tanks even as climatologists warn that future storms will carry more rain as global temperatures rise and ocean waters warm.

The U.S. Environmental Protection Agency has launched an investigation into the Valero tank failure, which may include a broader inquiry into the potential weaknesses of floating roofs, but declined comment. Environmental advocates and watchdog groups also have raised concerns about the roof failures, which exposed nearby residents to high levels of harmful emissions.

The Valero refinery, for example, is surrounded by the Manchester neighborhood in East Houston. When the floating roof collapsed during Hurricane Harvey, the company said, some 1,900 pounds of benzene, a volatile component of crude oil known to cause cancer, escaped into the air.

"The effects on the communities could be devastating," said Adrian Shelley, Texas director for Public Citizen. "There are homes that are literally in the shadows of these tanks."

Decades-old technology

About 400 of the more than 1,000 storage tanks in the Houston area employ floating roofs, but it is difficult to keep tabs on the exact figure because the number of tanks is expanding rapidly as the shale drilling boom transforms the Gulf Coast into hub for exporting crude, fuels and petrochemicals. The region's crude storage capacity alone has more than doubled in just six years, to more than 56 million barrels from 21 million, according to the investment research firm Morningstar.

Floating roof tanks are designed to reduce emissions by eliminating the buildup of vapors above volatile liquids, using decades-old technology for sealed roofs that float up and down on top of the liquid depending on levels in the tanks. The roofs have legs that prevent them from dipping too low into the tanks.

The tanks have drainage systems attached to the roofs that are supposed to funnel out rainfall and prevent too much from accumulating and weighing down the floating roofs. Rapid volumes of rain can cause the drainage systems to fail or simply

overwhelm the roofs.

Most floating roofs are designed to hold up to 10 inches of rain without drainage. Harvey dropped more than 50 inches in some areas.

Floating roof tanks also were responsible for the single-biggest spill of the storm. Some 11,000 barrels of gasoline - nearly 500,000 gallons - escaped from two storage

tanks at the Galena Park storage complex of Magellan Midstream, an Oklahoma pipeline company. About 11,000 people live in Galena Park.

While the spill was largely contained to Magellan's property, much of the gasoline evaporated, releasing some 2.5 million pounds of pollutants into the air, including 13,000 pounds of benzene. The company says it's still investigating the exact cause of the tank failures.

"We will take the lessons learned from Hurricane Harvey and apply them to our natural disaster plan in the future," Magellan spokesman Bruce Heine said.

Several of the worlds biggest energy giants also suffered floating roof failures, including Exxon Mobil and Royal Dutch Shell, while Houston energy giants like Kinder Morgan, Enterprise Products Partners and Phillips 66 all reported similar incidents. All told, these tank failures led to the release of a combined 400,000 pounds.

Shell reported the most problems with floating roof tanks. Four were affected by roof collapses or drainage failures - three in Deer Park and one at Port Neches. One roof sunk, two others leaked from the stress of the rain, and a fourth sprung a hole in its roof drain.

"As always we are reviewing our practices and procedures following this event to look for ways to prevent future incidents," said Gary Guilhas, Shell's health, safety and

environment manager at Deer Park, he added.

Failures of floating-roof tanks

During Hurricane Harvey, there were more than 15 incidents of floating roofs failing atop oil storage tanks leading to more than 3.1 million pounds of potentially dangerous emissions. These notable incidents were reported by the industry.

-Magellan Midstream, 2 tanks, Aug. 31, Galena Park terminal, 2.47 million pounds of

SEE MORE

Todd Staples, president of the Texas Oil & Gas Association, a trade group, said the industry will conduct a review of tank failures and look for ways to improve the design standards and best practices for floating roof tanks. Still, he added, the region's petroleum storage complex proved itself safe and resilient, arguing the number of spills and leaks were minimal considering the massive storm.

"It's a false narrative to see the response and recovery as anything but remarkable," said Todd Staples, president of the Texas Oil & Gas Association. "This was the most catastrophic rain event in the history of Texas."

Time for a change?

Neither the state nor federal government have regulations that spell out specific design codes for floating roofs and their drainage systems, but the industry's leading trade group, the American Petroleum Institute, has published nearly 500 pages of recommended minimum standards for storage tanks. Following those standards, however, is voluntary. API declined a request for an interview.

A safer alternative to the floating roof tanks could be so-called all weather tanks, according to CB&I, an engineering and construction firm that describes itself as the

according to CB&I, an engineering and construction firm that describes itself as the energy industry's most experienced tank builder. The all-weather tanks, also know as internal floating roof tanks, included a fixed roof above the floating roof to protect it from the weather. However, at least a couple of Harvey's floating roof tank failures included internal roof tanks.

All-weather tanks cost 10 to 20 percent more than floating roof tanks, said Brad Veath, vice president of sales for steel plate structures at CB&I, which is headquartered in The Woodlands. Bigger and better drainage systems might also help avoid the roof collapses under extreme conditions such as Hurricane Harvey, environmental watchdogs said.

Floating roof tanks, of course, weren't the only ones that experienced during Harvey. The Arkema chemical plant in Crosby - prior to power failures and explosions - had two overflowing tanks. BASF, Huntsman and Occidental Petroleum all reported storage tank leaks at chemical plants in the Houston and Beaumont areas, and some other companies had smaller tanks that became unmoored or flipped over.

But floating roofs experienced problems most frequently, and their failures released the most pollutants.

Neil Carman, clean air program director for Lone Star Chapter of the Sierra Club, the national environmental advocacy group, called for thorough state and federal investigations into the problems experienced by floating roof tanks and stricter laws and regulations for designing and maintaining these tanks.

The roofs are simply not designed to handle as much water as Harvey dumped, Carman said, and the drainage systems proved inadequate. He added that the industry can't assume that a storm similar to Harvey won't hit the area again for many years.

"There's been a few problems in the past," Carman said, "but this time it's a much bigger issue than the industry has experienced."

Written By
Jordan Blum

VIEW COMMENTS