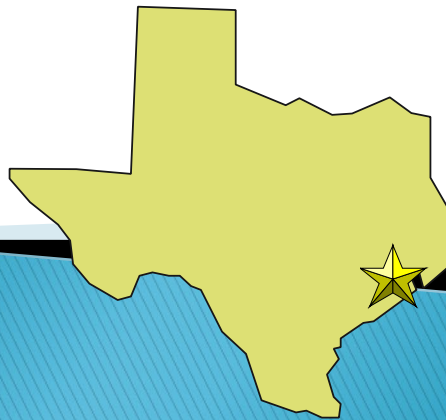


# 2020 Calendar Year Data

9-21 Emissions Report to DPCAC  
final 9-27-21 as presented

## TCEQ AIR EMISSIONS INVENTORY (EI) and EPA TOXICS RELEASE INVENTORY (TRI) for DEER PARK PLANTS



# Deer Park CAC Plants

## Reports both TCEQ Emissions Inventory and EPA Toxics Release Inventory (TRI)

- Clean Harbors
- Dow Chemical
- GEO Specialty Chemicals
- Hexion
- Lubrizol
- OxyVinyls Deer Park PVC/Caustic
- OxyVinyls Deer Park VCM
- Shell Deer Park
- Vopak

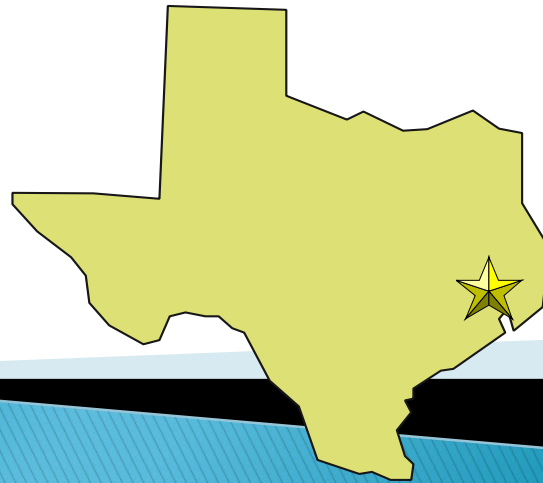
## Reports EPA TRI, not required to report TCEQ Emissions Inventory

- Evonik
  - Texas Molecular
  - Valvoline
- ITC Has been removed from the report, previous data has been retained to be included when reporting resumes

# About ITC's Data

- ▶ Intercontinental Terminals (ITC) is usually in the DPCAC report.
- ▶ They are required to file an Emissions Inventory with TCEQ.
- ▶ They are not required to file an EPA Toxics Release Inventory but have voluntarily reported TRI numbers to DPCAC for many years.
- ▶ They did not submit 2019 or 2020 this year.
- ▶ Previous reported data has been retained to be included when reporting resumes

# 2020 Air Emissions Inventory



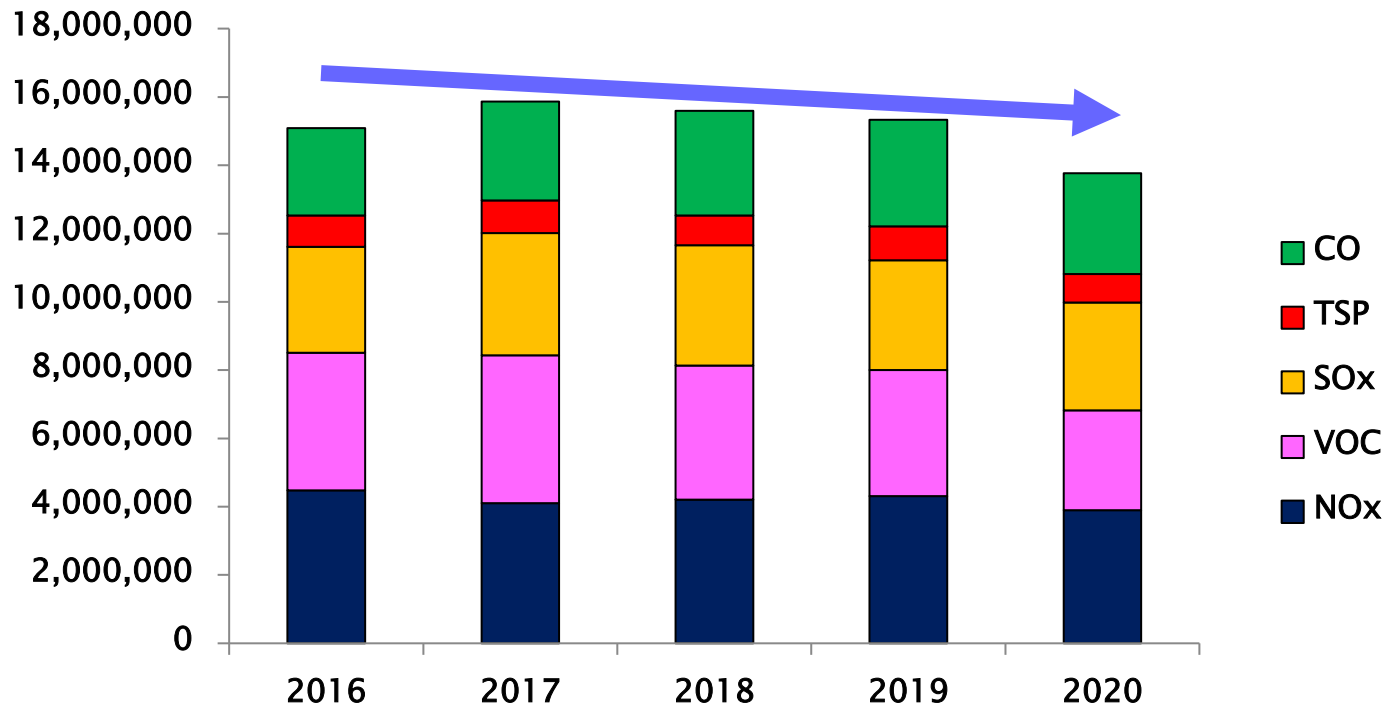
# Emissions Inventory of Criteria Pollutants and Ozone Precursors

## Criteria Pollutants Include:

- Nitrogen Oxides (NO<sub>x</sub>) {ozone precursor}
- Volatile Organic Compounds (VOCs) {ozone precursor}
- Carbon Monoxide (CO)
- Sulfur Oxides (SO<sub>x</sub>)
- Total Suspended Particulates (TSP)

# Total Reported Criteria Pollutant Emissions

(all values in lbs.)



**2016→2020: 9% Decrease in Total Criteria Pollutant Emissions**

**2019→2020: 10% Decrease in Total Criteria Pollutant Emissions**

# Total Reported Criteria Pollutant Emissions

(all values in lbs.)

Criteria Pollutant	2016	2017	2018	2019	2020
NOx	4,479,795	4,103,439	4,202,246	4,312,078	3,898,109
VOCs	4,027,869	4,333,191	3,935,446	3,964,405	2,923,514
CO	2,552,704	2,897,149	3,061,833	3,121,058	2,958,963
SOx	3,104,196	3,581,865	3,522,298	3,211,987	3,154,833
TSP	920,012	950,945	872,621	988,741	835,653
<b>Total</b>	<b>15,084,576</b>	<b>15,866,589</b>	<b>15,594,444</b>	<b>15,328,269</b>	<b>13,771,072</b>

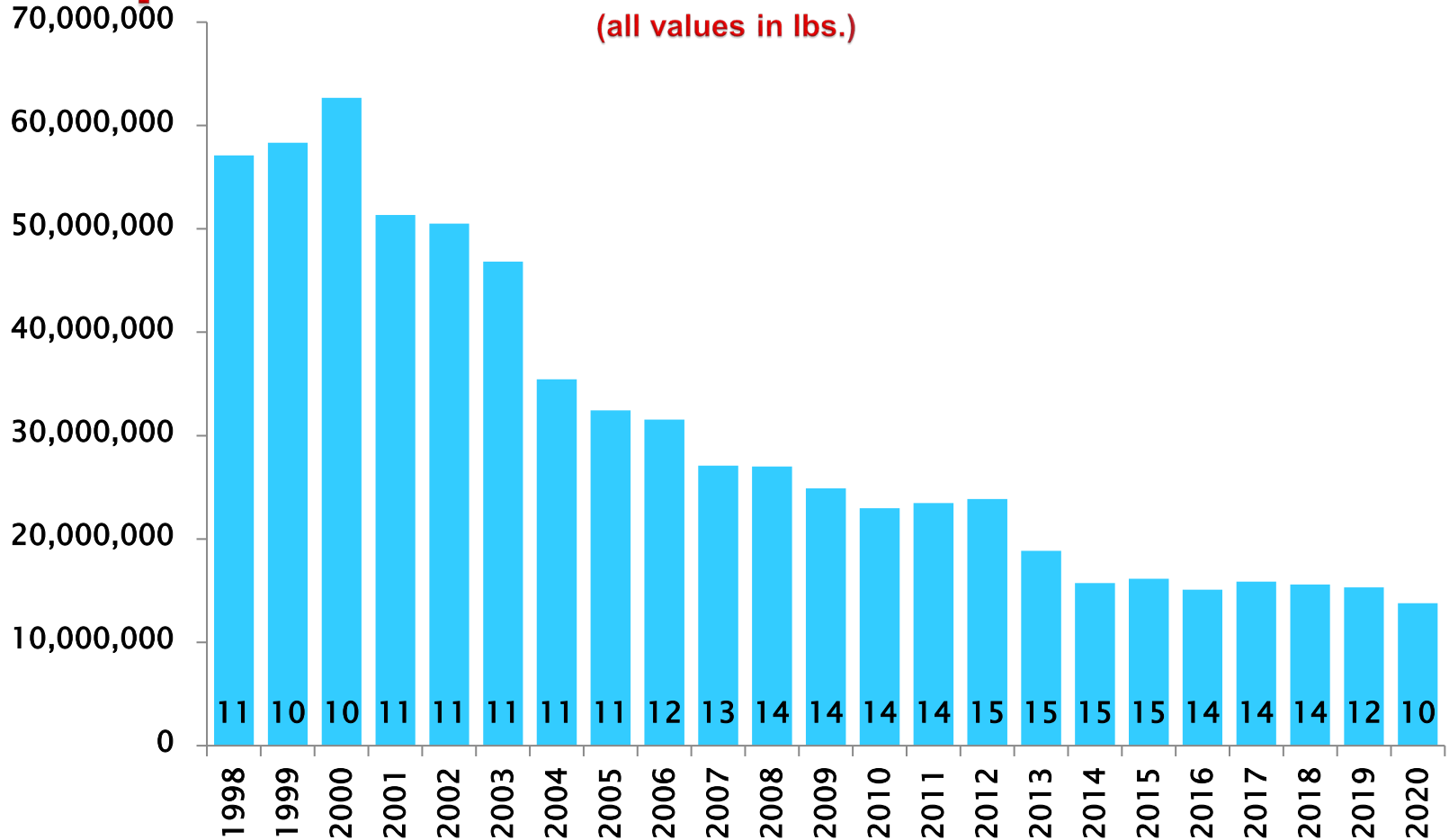
Changes from 2019 to 2020 by pollutant:

- NOx emissions down 414k lbs
- VOC emissions down 771k lbs
- SOx emissions down 57k lbs
- TSP emissions down 153k lbs
- CO emissions down 162k lbs

Note: "k" equals 1,000

# Reported Criteria Pollutant Emissions

(all values in lbs.)



**1998 → 2020: 76% Decrease in Emissions!**

number of plants on bars



# Total Reported Criteria Pollutant Emissions

(all values in lbs.)

Company	2016	2017	2018	2019	2020
Shell Deer Park	7,819,282	8,085,395	7,912,742	8,099,767	7,049,810
Dow Chemical	4,378,015	4,798,506	4,874,697	4,844,505	4,338,045
Lubrizol	777,479	751,835	666,238	819,143	908,083
Vopak	741,079	801,409	692,323	735,152	765,113
Hexion	251,902	256,300	251,322	247,540	245,627
Clean Harbors	235,565	291,114	184,111	272,840	177,774
OxyVinyls Deer Park VCM	130,935	132,087	132,156	139,864	120,277
OxyVinyls Deer Park PVC/Caustic	120,015	115,601	127,988	115,740	120,113
Evonik	24,600	24,600	25,500	25,500	25,000
GEO Specialty Chemicals	50,280	34,122	28,820	28,219	21,231
<b>TOTAL EI</b>	<b>29,058,304</b>	<b>15,290,969</b>	<b>14,895,897</b>	<b>15,328,270</b>	<b>13,771,073</b>

# 2020 Criteria Pollutant Emissions Highlights

Highlights provide explanations from the plants for any changes in emissions from previous year that are 10% or greater.

The reduction in emissions was primarily due to reduced equipment run times, lower production, and/or business demands as compared to previous years previous year.

# 2020 Criteria Pollutant Emissions Highlights

## Shell Deer Park

- NOx emissions decreased 13% (425k lbs) due to reduction in furnace use
- VOC emissions decreased 29% (530k lbs) due to less flaring
- CO emissions decreased 10% (211k lbs) due to less flaring
- SOx emissions increased 24% (98k lbs) due to emission events

## Dow Chemical

- NOx emissions increased 6% (41k lbs) due to increase in flare run time
- VOC emissions decreased 34% (239k lbs) due to flare down time
- CO emissions decreased 13% (77k lbs) due to decreased use of furnace
- TSP emissions decreased 54% (123k lbs) due to unit downtime and decreased use of furnace

## Lubrizol

- CO emissions increased 88% (146k lbs) due to full year emissions from new process unit
- SOx emissions decreased 72% (32k lbs) due to calculation methodology changes

# 2020 Criteria Pollutant Emissions Highlights

## Vopak

- NOx emissions decreased 24% (9k lbs) due to reduction in runtime for combustion device related to business demand
- SOx emissions decreased 22% (1k lbs) due to reduction in runtime for combustion device related to business demand
- VOC emissions increased 10% (48k lbs) due to business demand
- TSP emissions decreased 24% (1k lbs) due to reduction in runtime for combustion device related to business demand

## Clean Harbors

- NOx emissions decreased 19% (30k lbs) due to shipments from customer
- VOC emissions decreased 52% (14k lbs) due to shipments from customer
- CO emissions increased 50% (5k lbs) due to shipments from customer
- SOx emissions increased 359% (6k lbs) due to shipments from customer
- TSP emissions decreased 77% (62K lbs) due to shipments from customer

# 2020 Criteria Pollutant Emissions Highlights

## Oxy Vinyls – Deer Park VCM

- VOC emissions decreased 20% (5k lbs) due to reduced production in 2020
- CO emissions decreased 37% (12k lbs) due to reduced production in 2020
- SOx emissions increased 41% (114 lbs) due to changes in emission factor to AP-42 factor in 2020
- TSP emissions decreased 13% (2k lbs) due to reduced production in 2020

## Oxy Vinyls – Deer Park PVC

- SOx emissions decreased 19% (37 lbs) due to reduced hours of operation of fixed diesel engines and certain natural gas fired equipment.

## GEO Specialty Chemicals

- VOC emissions increased 54% (2k lbs) due to spray dryer and fluid bed dryer having higher operating hours
- CO emissions decreased 74% (9k lbs) due to reduced boiler operating hours
- TSP emissions increased 91% (1k lbs) due to spray dryer and fluid bed dryer having higher operating hours

# 2020 Criteria Pollutant Emissions Highlights

## Hexion

- SOx emissions decreased 22% (20k lbs) due to site implementation of replacement for imported methyl mercaptan and an enhanced process to recover it
- TSP emissions increased 53% (18k lbs) due to variability on volume of solids handled

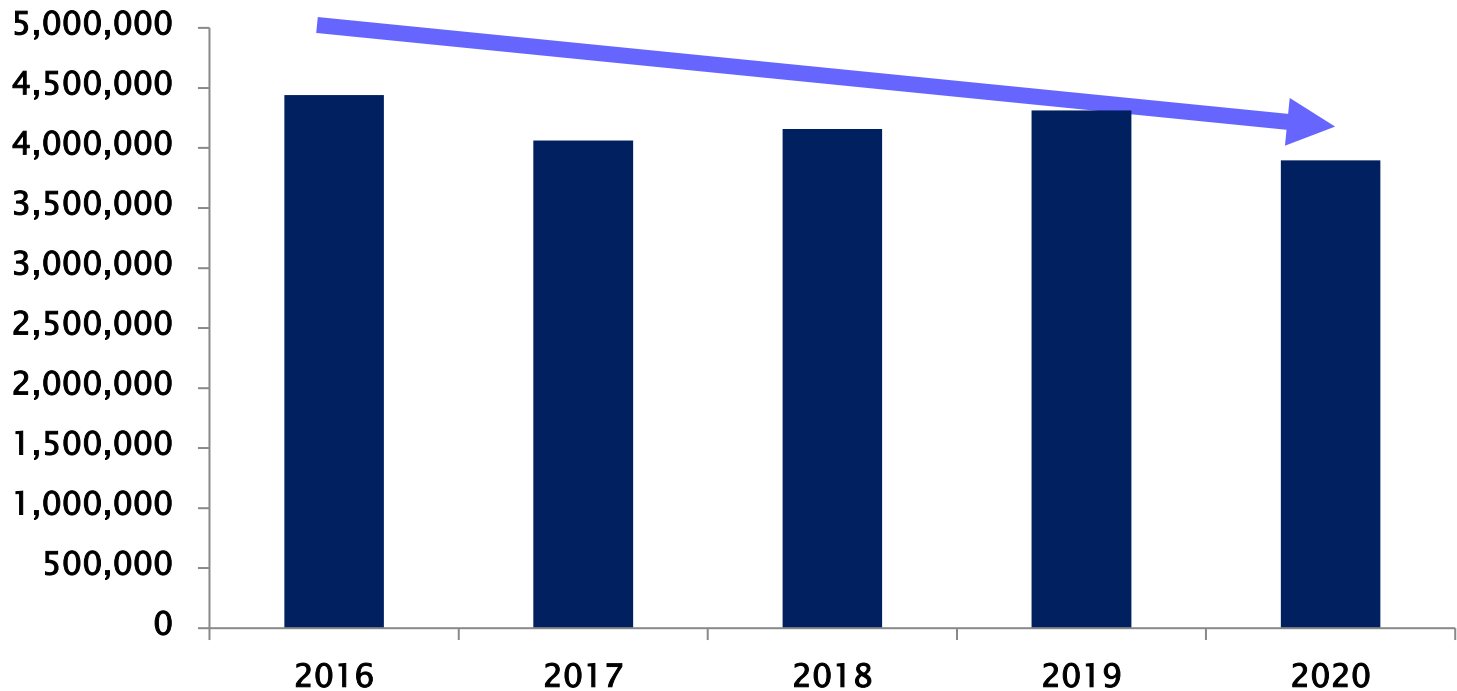
# Reported NOx Emissions

(all values in lbs.)

Company	2016	2017	2018	2019	2020
Shell Deer Park	3,373,748	2,990,496	3,223,004	3,231,792	2,807,199
Dow Chemical	609,568	617,733	555,272	658,372	699,578
Lubrizol	157,251	104,265	94,204	126,357	133,549
Clean Harbors	149,560	210,640	152,167	154,028	124,344
OxyVinyls Deer Park VCM	68,009	60,169	65,250	62,133	62,319
Vopak	26,367	25,559	24,040	38,753	29,455
Oxy Vinyls Deer Park PVC/Caustic	38,313	37,039	28,225	26,107	28,180
GEO Specialty Chemicals	15,848	14,016	13,258	12,374	11,242
Hexion	2,273	2,500	2,200	2,162	2,243
<b>TOTAL NOx</b>	<b>4,440,937</b>	<b>4,062,417</b>	<b>4,157,620</b>	<b>4,312,078</b>	<b>3,898,109</b>

# Reported NOx Emissions

(all values in lbs.)



**2016→2020 : 12% Decrease in NOx Emissions**

**2019→2020 : 10% Decrease in NOx Emissions**



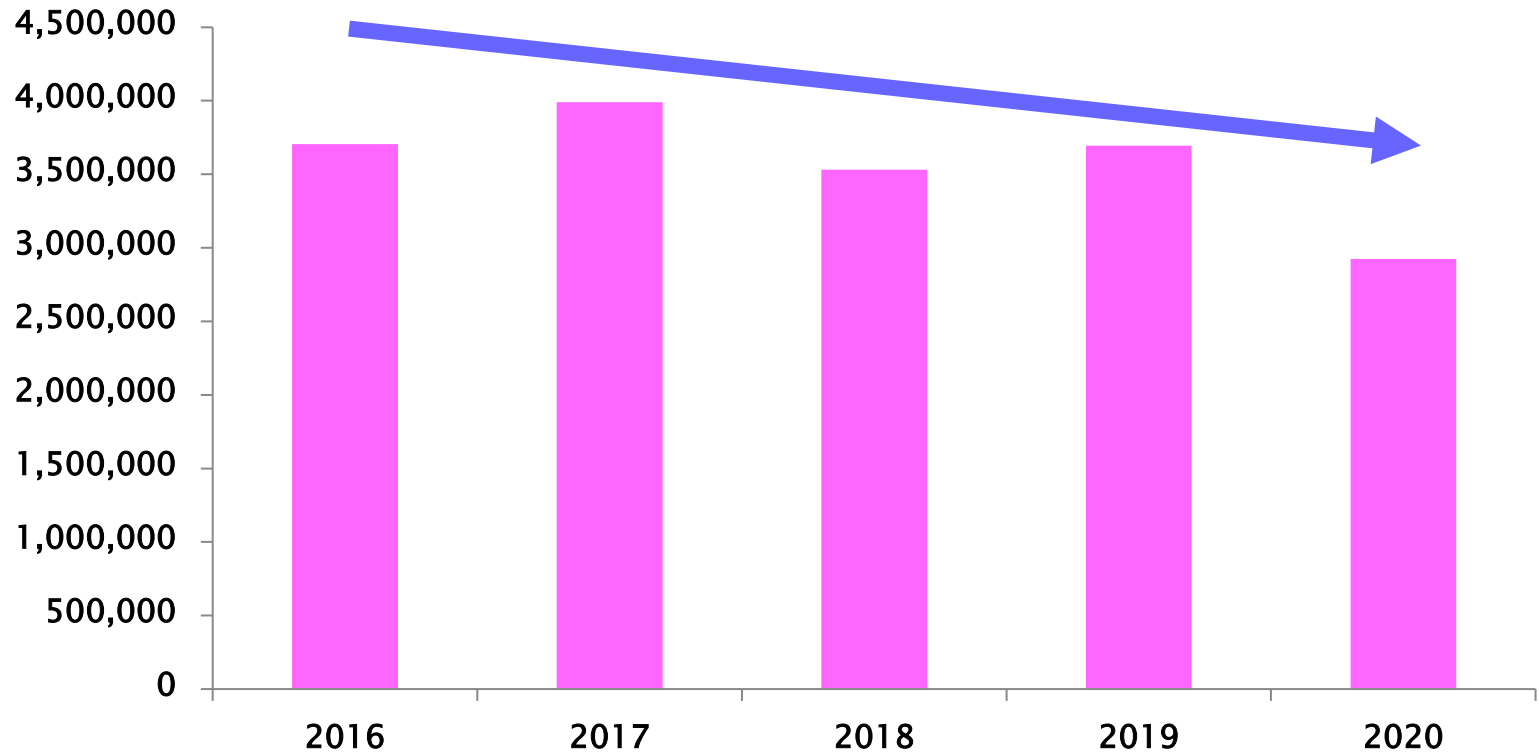
# Reported VOC Emissions

(all values in lbs.)

Company	2016	2017	2018	2019	2020
Shell Deer Park	2,150,630	2,345,133	1,944,886	1,849,771	1,319,576
Vopak	523,430	582,958	485,401	482,127	530,398
Dow Chemical	447,448	454,789	547,879	697,866	458,985
Lubrizol	394,175	408,574	369,897	459,746	429,036
Hexion	97,028	101,800	100,600	100,767	99,859
Evonik	24,600	24,600	25,500	25,500	25,000
OxyVinyls Deer Park PVC/Caustic	30,109	30,951	25,757	23,307	23,081
OxyVinyls Deer Park VCM	20,678	29,492	22,841	24,877	19,833
Clean Harbors	6,326	8,362	4,517	27,561	13,320
GEO Specialty Chemicals	10,930	3,196	3,180	2,883	4,426
<b>TOTAL VOCs</b>	<b>3,705,354</b>	<b>3,989,855</b>	<b>3,530,458</b>	<b>3,694,405</b>	<b>2,923,514</b>

# Reported VOC Emissions Trends

(all values in lbs.)



**2016→2020 : 21% Decrease in VOC Emissions**

**2019→2020 : 21% Decrease in VOC Emissions**

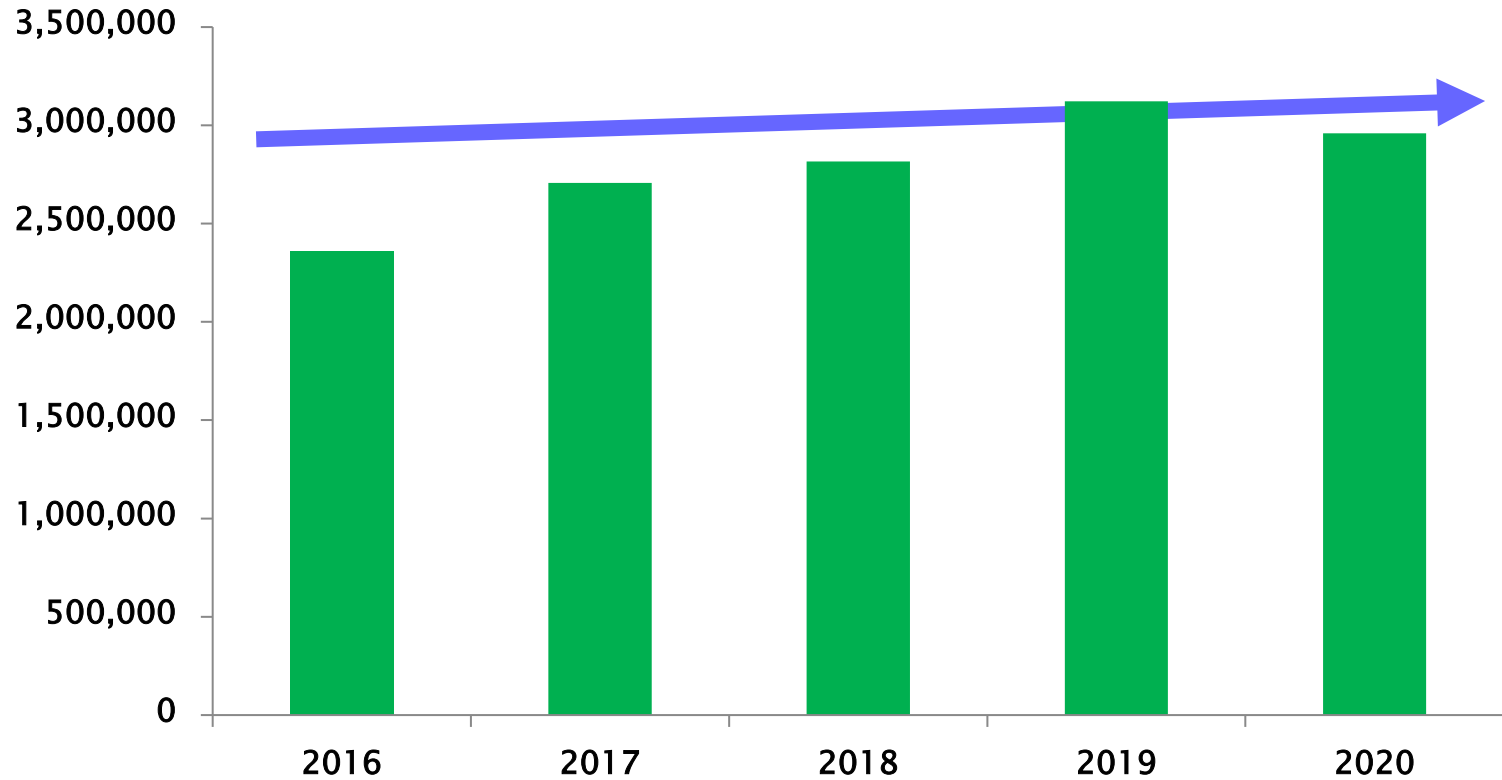
# Reported CO Emissions

(all values in lbs.)

Company	2016	2017	2018	2019	2020
Shell Deer Park	1,460,447	1,816,176	1,825,994	2,050,460	1,839,808
Dow Chemical	480,407	454,018	581,906	598,319	520,952
Lubrizol	152,863	174,037	140,768	165,415	311,249
Vopak	186,715	188,547	173,989	203,096	196,625
OxyVinyls Deer Park PVC/Caustic	8,064	7,992	33,879	30,559	32,681
OxyVinyls Deer Park VCM	19,322	22,610	25,034	33,406	21,025
Hexion	19,486	21,300	19,222	18,535	19,232
Clean Harbors	10,114	7,031	3,605	9,791	14,670
GEO Specialty Chemicals	21,538	14,794	10,828	11,477	2,721
<b>TOTAL CO</b>	<b>2,358,956</b>	<b>2,706,505</b>	<b>2,815,225</b>	<b>3,121,058</b>	<b>2,958,963</b>

# Reported CO Emissions

(all values in lbs.)



**2016→2020 : 25% Increase in CO Emissions**

**2019→2020 : 5% Decrease in CO Emissions**

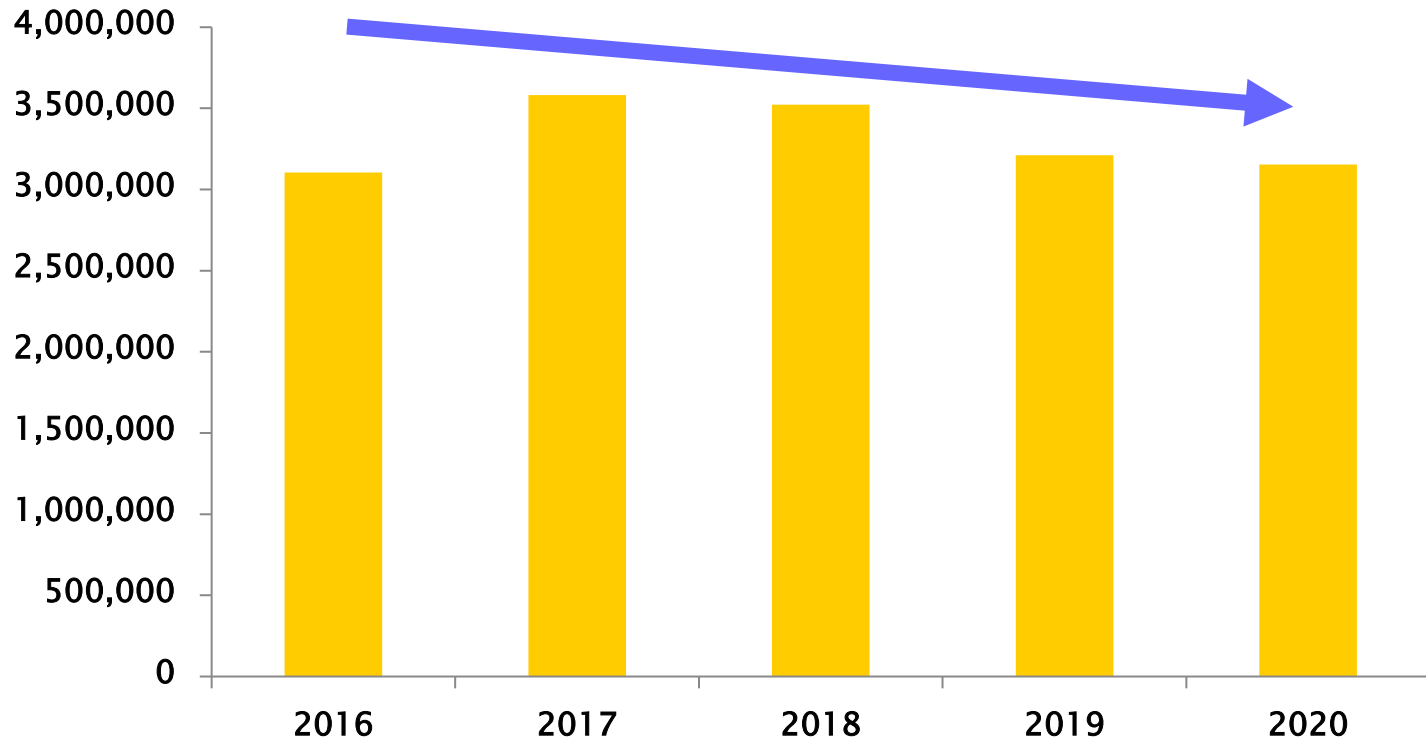
# Reported SOx Emissions

(all values in lbs.)

Company	2016	2017	2018	2019	2020
Dow Chemical	2,665,777	3,092,206	2,976,875	2,663,113	2,555,193
Shell Deer Park	306,253	368,875	418,779	406,172	504,562
Hexion	90,473	82,700	82,700	90,804	70,462
Lubrizol	39,221	35,553	37,766	43,963	12,382
Clean Harbors	1,614	1,641	464	1534	7,040
Vopak	128	110	4,701	5,927	4,643
OxyVinyls Deer Park VCM	306	260	293	278	392
OxyVinyls Deer Park PVC/Caustic	273	226	136	196	159
<b>TOTAL SOx</b>	<b>3,104,045</b>	<b>3,581,571</b>	<b>3,521,714</b>	<b>3,211,987</b>	<b>3,154,833</b>

# Reported SOx Emissions

(all values in lbs.)



**2016→2020 : 2% Increase in SOx Emissions**

**2019→2020 : 2% Decrease in SOx Emissions**

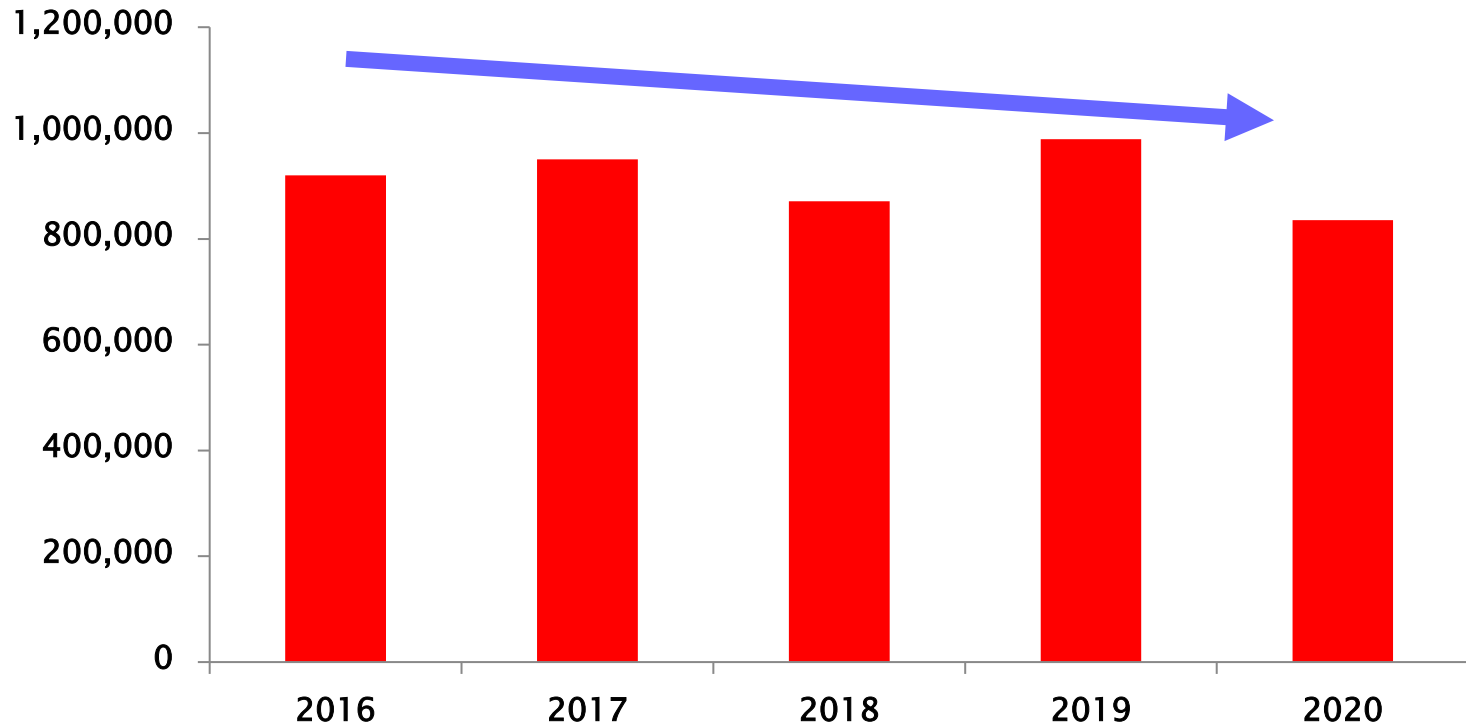
# Reported TSP Emissions

(all values in lbs.)

Company	2016	2017	2018	2019	2020
Shell Deer Park	528,204	564,715	500,080	561,572	578,665
Dow Chemical	174,815	179,760	212,765	226,835	103,337
Hexion	42,642	48,000	46,600	35,272	53,830
OxyVinyls Deer Park PVC/Caustic	43,257	39,393	39,991	35,570	36,012
Lubrizol	33,969	29,406	23,603	23,662	21,867
Clean Harbors	67,951	63,440	23,358	79,926	18,400
OxyVinyls Deer Park VCM	22,620	19,556	18,738	19,170	16,708
Vopak	4,439	4,235	4,192	5,249	3,992
GEO Specialty Chemicals	1,964	2,116	1,554	1,485	2,842
<b>TOTAL TSP</b>	<b>919,861</b>	<b>950,621</b>	<b>870,881</b>	<b>988,741</b>	<b>835,653</b>

# Reported TSP Emissions

(all values in lbs.)

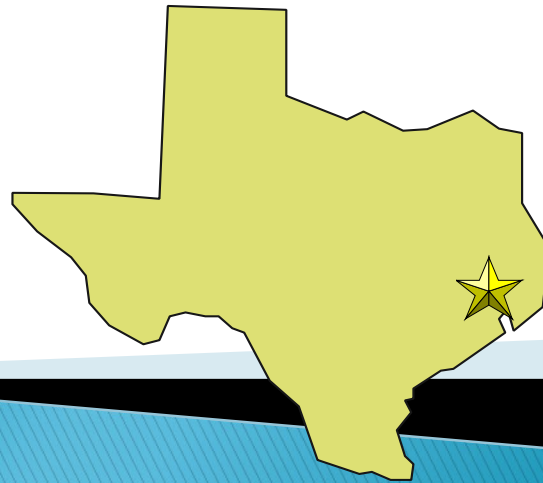


**2016→2020 : 9% Decrease in TSP Emissions**  
**2019→2020 : 15% Decrease in TSP Emissions**

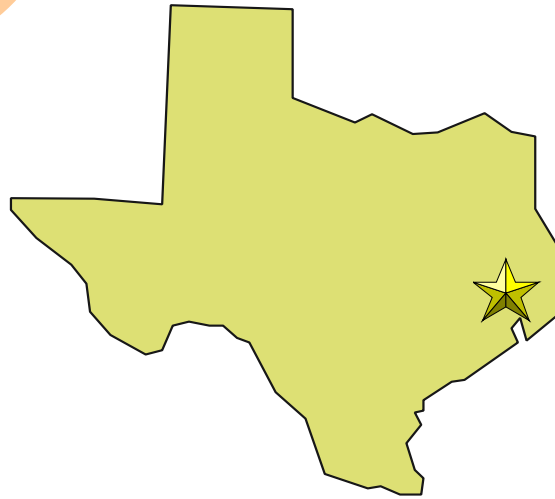




**Questions?**

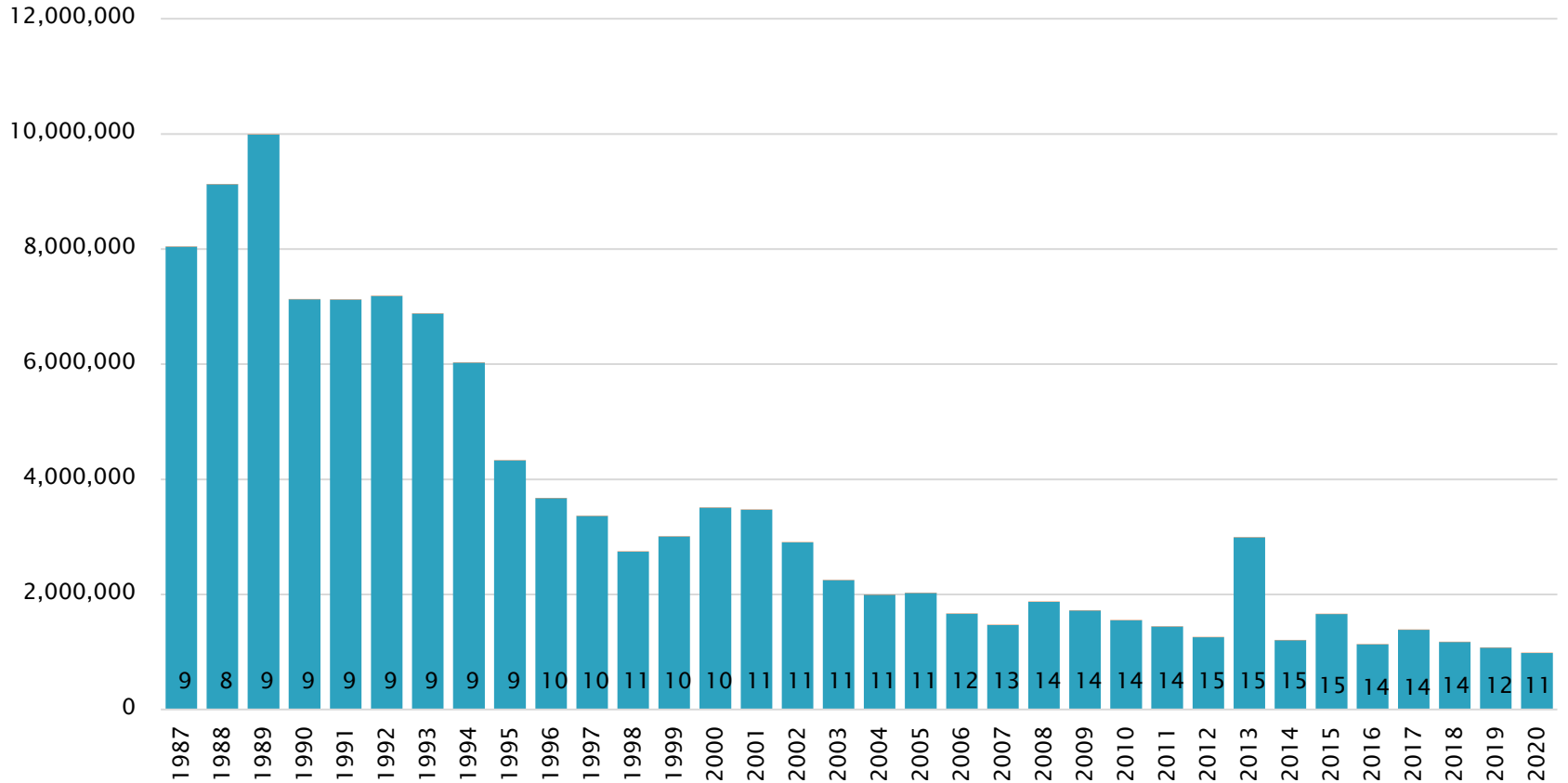


# 2020 TRI Releases to Air



# Reported TRI Air Releases

(all values in lbs.)



**1987 → 2020: 88% Decrease in TRI Air Emissions!**

number of plants on bars

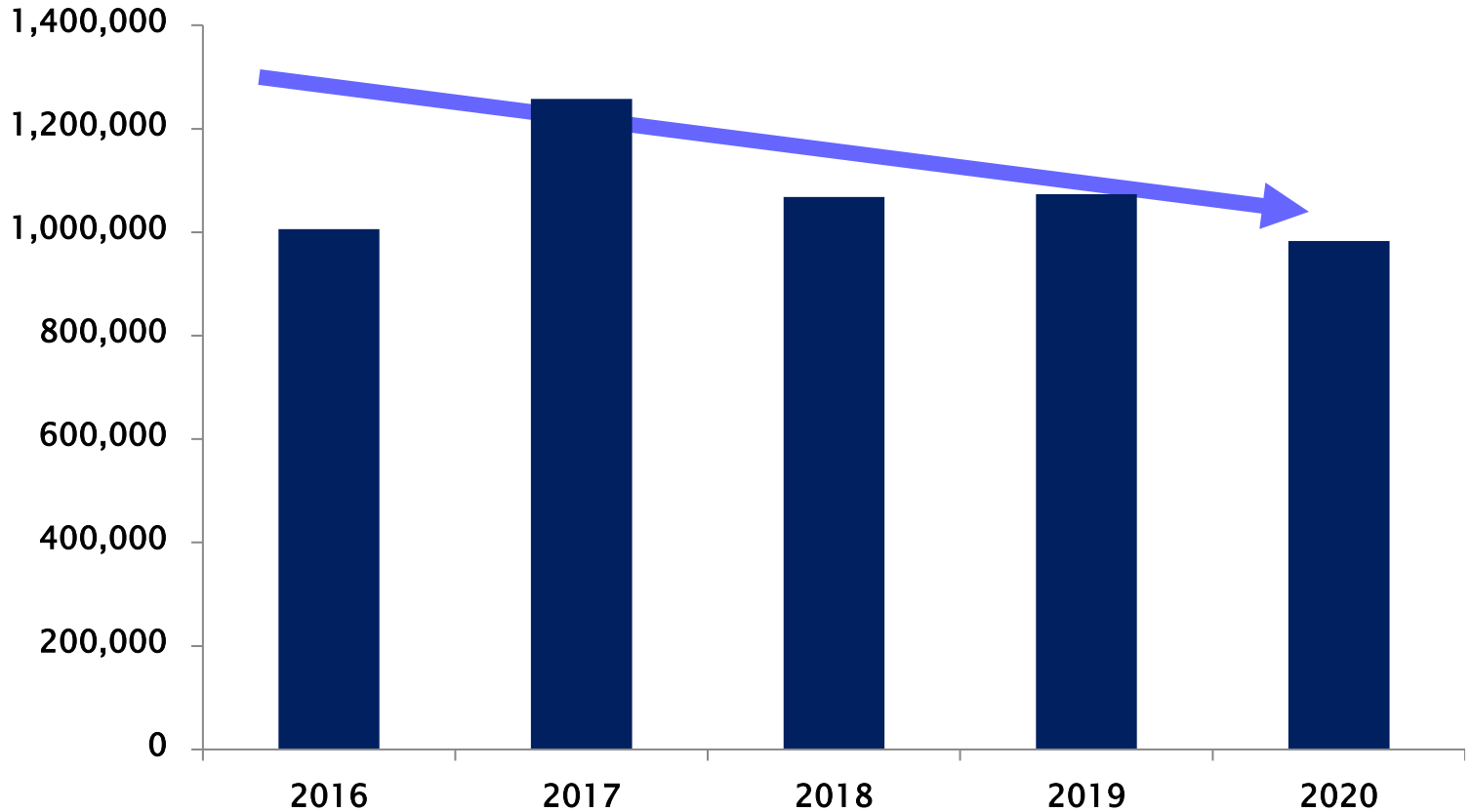
# Reported TRI Air Releases

(all values in lbs.)

Company	2016	2017	2018	2019	2020
Shell Deer Park	598,069	827,456	638,075	605,796	525,497
Dow Chemical	218,859	218,339	243,622	244,795	247,452
Hexion	50,000	46,500	46,500	46,708	52,788
OxyVinyls Deer Park VCM	36,163	45,753	39,605	41,882	36,905
OxyVinyls Deer Park PVC/Caustic	27,176	34,154	31,849	32,567	35,310
Lubrizol	40,939	51,207	35,693	37,138	33,788
Clean Harbors	5,623	7,259	4,961	19,574	17,939
Vopak	NR	NR	NR	25,721	16,045
GEO Specialty Chemicals	26,656	24,398	25,479	15,827	13,909
Texas Molecular	1,479	1,221	916	2,103	2,154
Evonik	1,212	1,287	1,397	1,409	1,381
Valvoline	5	5	1	1	1
<b>TOTAL TRI to AIR</b>	<b>1,006,181</b>	<b>1,257,579</b>	<b>1,068,098</b>	<b>1,073,521</b>	<b>983,169</b>

# Reported TRI Air Releases

(all values in lbs.)



**2016→2020: 2% Decrease in TRI Air Emissions**

**2019→2020: 8% Decrease in TRI Air Emissions**

# TRI Air Release Highlights

## Shell Deer Park

- Decrease of 13% (80k lbs) due to less flaring, furnace firing reductions, and calculation methodology

## Hexion

- Increase of 13% (6k lbs) due to variation of solids handled

## Oxy Vinyls, LP – Deer Park VCM

- Decrease of 12% (5k lbs) due to reduced production in 2020

## Vopak

- Decrease of 38% (10k lbs) due to a decrease in the storage of a TRI chemicals related to business demand

## GEO Specialty Chemicals

- Decrease of 12% (2k lbs) due to drying of different DAXD products that have less emissions

# Reported Benzene Air Releases

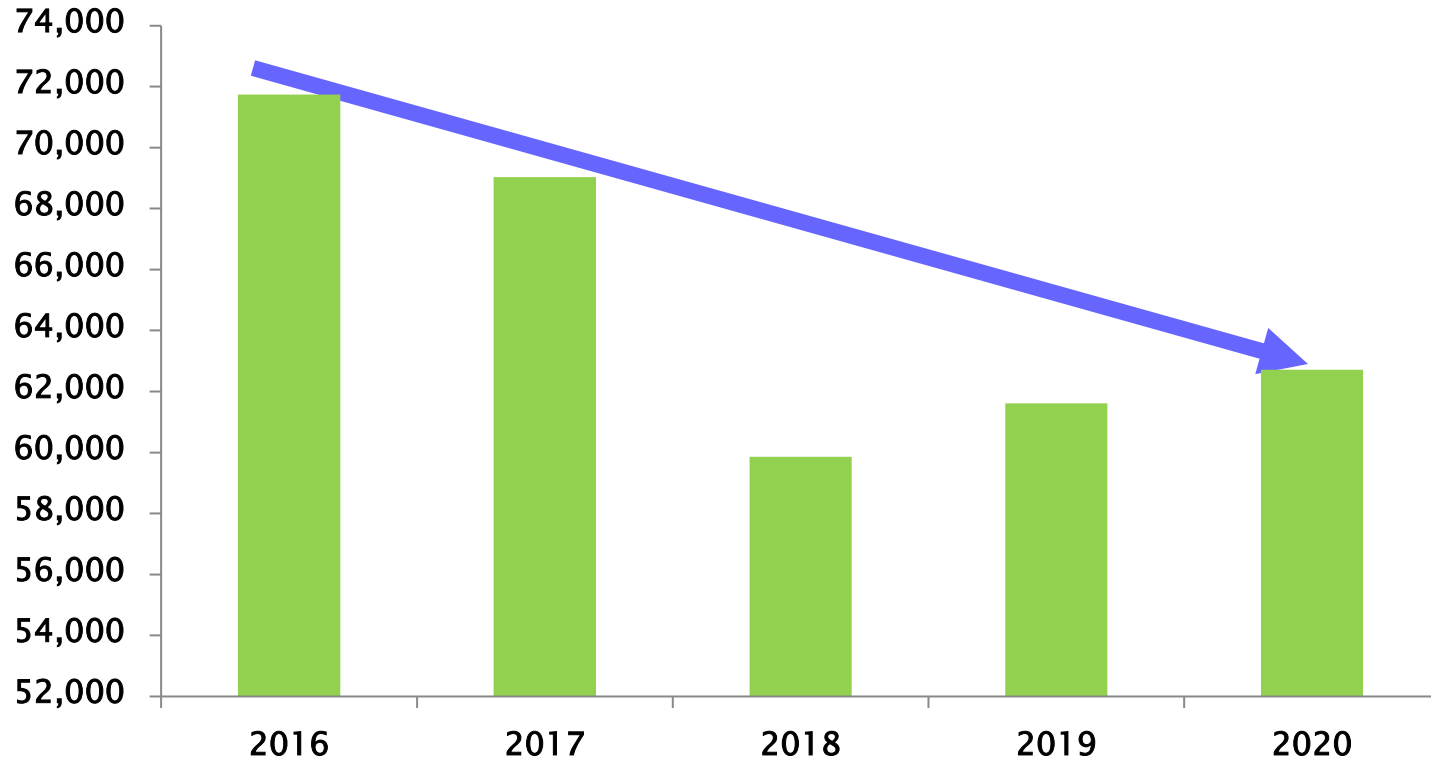
(all values in lbs.)

Company	Activity	2016	2017	2018	2019	2020
Shell Deer Park	Production	47,380	45,228	36,371	39,002	33,585
Vopak	Storage/Loading	23,907	23,257	23,144	21,713	28,681
Texas Molecular	Waste Contaminant	143	176	147	288	279
Clean Harbors	Waste Contaminant	281	338	171	583	106
Lubrizol	Raw Material Contaminant	20	23	15	20	55
Hexion	Reaction By-product	3	3	3	3	3
OxyVinyls Deer Park VCM	Reaction By-product	4	5	4	4	2
<b>TOTAL Benzene</b>		<b>71,738</b>	<b>69,030</b>	<b>59,855</b>	<b>61,613</b>	<b>62,711</b>

Only companies that reported data are listed.

# Reported Benzene Air Releases

(all values in lbs.)



**2016→2020: 13% Decrease in Benzene Air Emissions**

**2019→2020: 2% Increase in Benzene Air Emissions**



# Benzene Air Release Highlights

## Shell

- 14% (5k lbs) decrease due to less flaring

## Vopak

- 32% (7k lbs) increase due to an increase in business demand

## Clean Harbors

- 82% (477 lbs) decrease due to shipments from customers.

## Lubrizol

- 175% (35 lbs) increase due wastewater emissions

## Oxy Vinyls Deer Park VCM

- 50% (2 lb) decrease due to reduced production

# Reported 1,3-Butadiene Air Releases

(all values in lbs.)

Company	2016	2017	2018	2019	2020
Shell Deer Park	37,761	65,224	52,558	52,000	33,552
Lubrizol	5,249	1,649	1,649	2,182	1,979
Clean Harbors	2	1	0	0	0
<b>TOTAL 1,3-Butadiene</b>	<b>43,012</b>	<b>66,874</b>	<b>54,207</b>	<b>54,182</b>	<b>35,531</b>

## Highlights

### Shell Deer Park

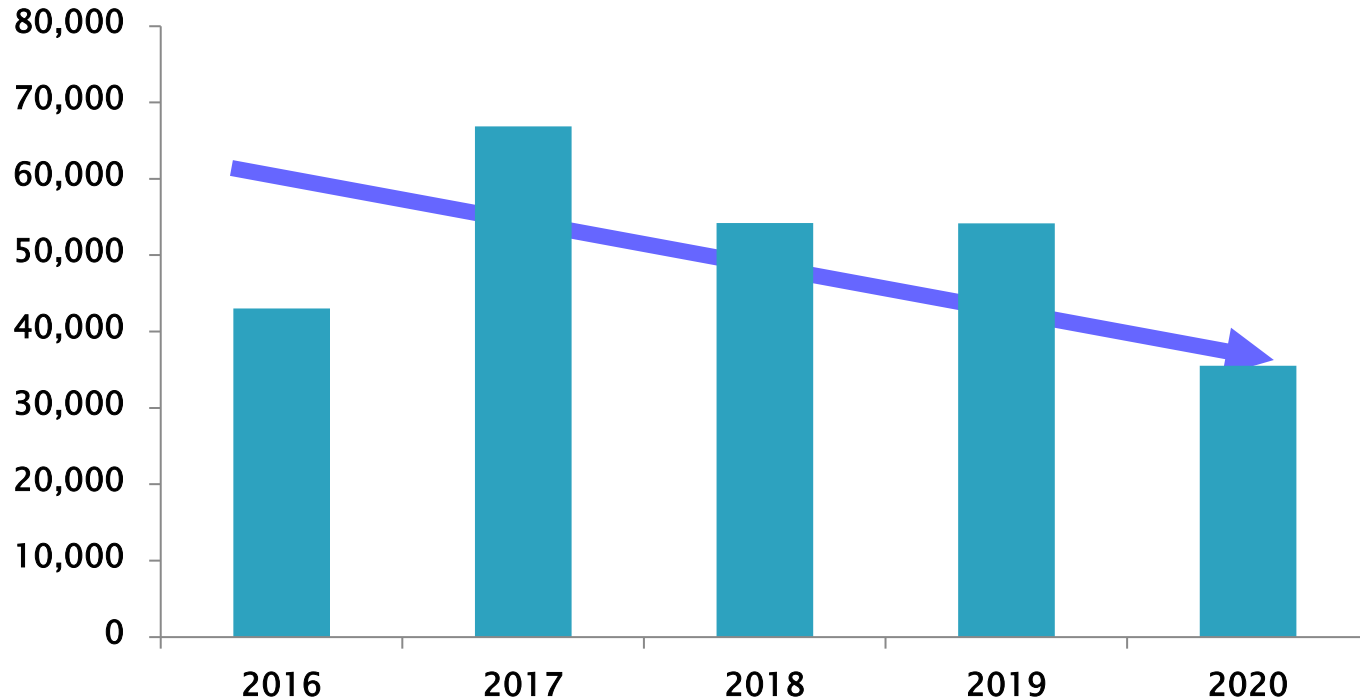
- 35% (18,448 lbs) decrease due to less flaring in 2020.

### Lubrizol

- 9% (203 lbs) decrease due to slight reduction in process unit production in 2020

# Reported 1,3-Butadiene Air Releases

(all values in lbs.)



**2016→2020: 17% Decrease in 1,3-Butadiene Air Emissions**

**2019→2020: 34% Decrease in 1,3-Butadiene Air Emissions**

# Comparison With Other CACs 2010 - 2019

## ▶ BAYCAP (26 plants)

- TRI air - 25 %
- NOx - 4 %
- VOCs - 21 %

## ▶ Pasadena CAC (18 plants)

- TRI air - 63 %
- NOx + 5 %
- VOCs - 24 %

## ▶ Deer Park CAC (12 plants)

- **TRI air - 20 %**
- **NOx - 14 %**
- **VOCs - 29 %**

## ▶ La Porte CAC (47 plants)

- TRI air - 24 %
- NOx - 4 %
- VOCs - 0 %

# 2019 State and County Comparisons

## VOCs

- Texas 178,000,000 lbs.
- Harris Co. 32,255,096 lbs.
- DPCAC 3,694,405 lbs.
  
- 2% of state VOC Emissions Inventory from DPCAC plants
- 11% of county VOC EI from DPCAC plants

## NOx

- Texas 480,000,000 lbs.
- Harris Co. 30,807,733 lbs.
- DPCAC 4,312,078 lbs.
  
- 0.9% of state NOx Emissions Inventory from DPCAC plants
- 14% of county NOx EI from DPCAC plants

Number of facilities submitting an emissions inventory to TCEQ:  
2,024 in Texas, 246 in Harris Co., 9 in DPCAC

# Summary of Changes 2019 – 2020

## Emissions Inventory

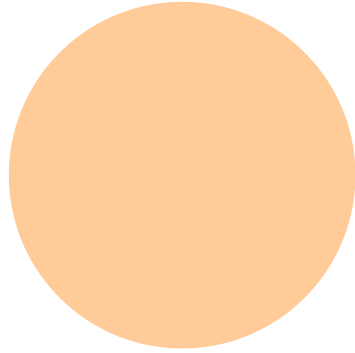
- NO<sub>x</sub>, VOC, CO, TSP & SO<sub>x</sub> ↓

## Toxics Release Inventory

- TRI Releases to Air ↓

## Benzene Emissions ↑

## 1,3-Butadiene Emissions ↓



# Questions?

